Nile Basin Initiative Shared Vision Program

Transboundary Environmental Analysis

May 2001

Nile Basin Initiative Global Environment Facility United Nations Development Programme World Bank

Contents

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List of Maps

The environmental threats identified in the transboundary analysis are depicted on the ba-sin-wide map. Individual maps are attached for each basin country highlighting environmental issues of transboundary significance in more detail.

TRANSBOUNDARY ENVIRONMENTAL ANALYSIS FOR THE NILE RIVER BASIN (IBRD 30967)

BURUNDI (IBRD 30966) CONGO, D.R.

(IBRD 30961) EGYPT, A.R. OF (IBRD

30957) ETHIOPIA (IBRD 30960) KENYA

(IBRD 30963) RWANDA (IBRD 30965)

SUDAN (IBRD 30958) TANZANIA (IBRD

30964) UGANDA (IBRD 30962)

Preface

The Nile River basin is a truly unique environment that has played a significant part in world history. Today it provides a home and sustenance to tens of millions of people, many of them among the world‘s poorest. This extreme poverty is closely linked to the environmental resources on which so many of the basin‘s people depend for survival. While these resources are recognized as having global significance, they are threatened by a variety of factors œ some obvious, some extremely complex. As a result, adverse environmental trends are undermining many of the attempts by the riparian nations to make a transition towards sustainable economic development.

Recognizing the scope and urgency of their shared problems, the Nile riparian countries have taken an historic step towards cooperation in the establishment of the Nile Basin Initiative (NBI). Formally launched in February 1999, the NBI is a transitional mechanism that provides an agreed framework to fight poverty and promote economic development. The Initiative is guided by a shared vision —to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile basin water resources“ and a set of policy guidelines which provide a basin-wide framework for cooperative action.

This Transboundary Environmental Analysis has been developed by the Nile riparian countries in cooperation with the United Nations Development Programme and the World Bank, and with funding from the Global Environment Facility. The process was also supported by a USAID-financed scoping study. Priority issues to be addressed at basin-wide, national and local levels have been identified and analyzed. The elements of an *Agenda for Environmental Action* in the Nile basin have also been defined, for implementation over the next decade or more under the NBI‘s Strategic Action Program in coordination with other development activities. Finally, the priority transboundary activities to be addressed collaboratively in the initial implementation phase of the *Agenda for Environmental Action* are outlined in the form of a proposed project.

The Transboundary Environmental Analysis is intended as both a catalyst and a valuable resource to the Nile riparian countries and their international partners as their historic political cooperation begins to be translated into effective operational measures aimed at sustainable economic development in the Nile basin.

Acknowledgements

Thanks are due to the many people and organizations throughout the Nile basin and beyond who generously shared their time and expertise in contributing to this analysis. Annex 8 lists the individuals directly involved in leading the national consultations and drafting the reports on which this analysis is based. Important logistical support has been provided throughout by the Nile Basin Secretariat, while funding has been provided by the Global Environment Facility, the United Nations Development Programme and the World Bank.

Abbreviations and Acronyms

CIDA Canadian International Development Agency DSS Decision Support System EAC East African Community EIA Environmental Impact Assessment ENSAP Eastern Nile Subsidiary Action Program FAO United Nations Food and Agricultural Organisation GDP Gross Domestic Product GEF Global Environment Facility GIS Geographic Information System ICCON International Consortium for Cooperation on the Nile IGAD Intergovernmental Authority on Development IMS Information Management Systems IUCN World Conservation Union LVEMP Lake Victoria Environmental Management Project NBI Nile Basin Initiative NELSAP Nile Equatorial Lakes Subsidiary Action Program NGO Nongovernmental Organization Nile-COM Council of Ministers of Water Affairs of the Nile Basin States Nile-SEC Nile Basin Initiative Secretariat Nile-TAC Nile Technical Advisory Committee PCU Project Coordination Unit RCE Regional Center of Endemism Sida Swedish International Development Agency SVP Shared Vision Program UNDP United Nations Development Programme USAID United States Agency for International Development

The Nile is the world‘s longest river. It flows 6,600 kilometers, traversing more than 35 degrees of latitude and drains an area of about 3.1 million square kilometers, one-tenth of the African continent. It is generally agreed that the Nile has several sources. The principal streams are the White Nile, which begins in the Great Lakes region of Central Africa; and the Blue Nile and the Atbara, both flowing from the highlands of Ethiopia. The Nile‘s most distant source is the Kagera River, which flows from Burundi through Rwanda and Tanzania into Lake Victoria. The Nile basin is home to about 160 million people and includes parts of ten countries œ Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda.

The extraordinary physical and ecological features of the Nile River have supported a dramatic evolution and expansion of human activity. In many places the Nile remains very much as it has been since the dawn of time, while the basin has witnessed the rise and decline of some of the ancient world‘s most advanced civilizations. The yearlong availability of Nile water supported some of the world‘s earliest agricultural settlements, with annual floods carrying enough fertile silt to turn thousands of miles of desert into an agricultural paradise. The basin‘s most significant man-made feature of modern times is the

Background and Process

Aswan High Dam completed in 1970, which provides control over the annual flood in Egypt and created the Lake Nasser (Lake Nubia) reservoir stretching 500 kilometers upstream into Sudan. South of the High Dam the Nile continues to flood annually, most spectacularly in northern Sudan as the Blue Nile and Atbara Rivers drain heavy seasonal rainfall from the Ethiopian Plateau.

The range of ecosystems within the Nile basin rivals that of any other river basin in the world, with high mountains, tropical forests, woodlands, savannas, high and low altitude wetlands, arid lands and deserts, culminating in an enormous delta partially below sea level. Tropical rain forests are found along the divide of the Nile and Congo Rivers, in the Lake Victoria basin and in southwestern Ethiopia. These are the most important areas for plant species diversity in the Nile basin. However, other parts of the basin, such as Sudan and Egypt, are notable for their unique dryland biodiversity, while Ethiopia especially is home to important land races and progenitors in the agrobiodiversity field. Mixed woodlands and savannas predominate north of Lake Victoria and on parts of the Ethiopian Plateau. Rainfall gradually decreases as the semi-desert begins further north in the Sahel and Sahara zones, and most life is found along the river edges after the transition to true desert in northcentral Sudan. Highly productive wetland ecosystems are well represented in the basin, supporting large numbers of people, livestock and fisheries as well as wildlife habitats. These include swamps, marshes, seasonally inundated grasslands and sedgelands, swamp forests, floodplains and the wetland edges of lakes and rivers. The 30,000 square kilometer Sudd in southern Sudan is the largest wetland in Africa. Important fish, mammal and bird species are found throughout the basin.

The overwhelming majority of people in the Nile basin lives in rural areas and depends directly on land and water resources for shelter, income and energy. Only Egypt is highly urbanized, with nearly half of its population living in towns and cities. Human land use is most widespread in the more humid southern parts of the basin where rainfed agriculture predominates. Pastoralism and livestock production become relatively more important in the moist and then drier savannas further north. Cultivation in the north of the basin is highly concentrated in relatively small irrigated areas close to the river. Primary crops in the south are varied, with cereals, legumes, tubers, bananas and coffee all being important, while cereals plus fodder and cotton are most common in the north.

Development Challenges

Despite the basin‘s extraordinary natural endowments and rich cultural history, its people face considerable challenges. Six of the ten Nile countries are among the world‘s poorest, with a per capita Gross Domestic Product (GDP) of less than US$250. The combined population of the Nile countries increased 3.5 times between 1950 and 1998, and now includes millions of people displaced by numerous natural disasters and conflicts. Many key quality of life indicators such as life expectancy, child mortality, malnutrition and literacy have stubbornly refused to improve during recent decades. Such grinding poverty in combination with very rapid population growth has put enormous pressure on the natural resources and ecological systems on which economic development is based. The very poor are often landless laborers, small farmers, agricultural workers, or pastoralists with no alternative to direct dependence on natural resources such as water, soil and fishing for subsistence and income.

Efforts to reduce poverty and stimulate sustainable economic growth in the Nile basin are being undermined by a variety of environmental problems œ soil erosion, degradation of agricultural lands, desertification, loss of forests and wetlands, overgrazing of pastures, declining water quality, overexploitation of fisheries, eutrophication of lakes, invasive water weeds, inadequate urban waste management, waterborne diseases, declining biodiversity and the threat of climate change.

As a result, there is an urgent need to integrate environmental concerns into poverty alleviation and economic development strategies.

The linkages between environmental conditions and human welfare are extraordinarily complex. Human development depends on the ability of the environment to provide a variety of goods and services and to sustain these into the future. People rely on their environment for food, drinking water, shelter, energy and medicine. Ecological processes maintain soil productivity, nutrient cycling, the cleansing of air and water, and climatic cycles. Air and water quality are key determinants of human health. Healthy soils are fundamental for food production, while genetic diversity supports the agricultural programs that are vital for the growth of food supplies. These linkages strongly suggest that a lasting reduction in poverty is not possible without ensuring that:

. • The environment continues to provide fundamental ecological services for the benefit of current and future generations.
. • Human health is protected from the adverse effects of pollution.

. • Environmental services such as the provision of water, sanitation and waste collection and disposal benefit all segments of society, especially the poor.
. • Natural resources are used in a way that does not compromise long-term development.
. • Environmental risks are recognized, managed and mitigated.

Efforts to Promote Sustainable Development

There is a long history of cooperation between the Nile countries and their international partners on promotion of economic development, and more recently environment and natural resource management, within each of the riparian countries. Sustainable development and environmental conservation appear as prominent goals in most of the riparian countries‘ national development plans and strategies, with a variety of programs, plans, actions and institutional arrangements having been put in place to protect the environment. These include national environmental action plans, national state of the environment reports, national conservation strategies, national biodiversity strategies and action plans, and in most cases the adoption of key international environmental agreements and conventions (see Annex 7).

Implementation of these plans and programs has been hampered by a lack of financial resources, inadequate human and institutional capacities and sub-optimal policies. Integrating environment and development within sectoral decision making and economic planning remains at a preliminary stage, and the improvement of institutional capacities for environmental management remains a major goal and challenge. Significant progress has been made in some countries towards the adoption of environmental laws and standards, although enforcement often remains problematic.

In some countries the pursuit of self-standing environmental projects and reactive environmental policies has reinforced the view of the environment as an *add-on* or separate sector. This approach has limited the true integration of environmental and natural resource management concerns into long-term policy dialogue and sectoral investment programs. Institutional boundaries and incentives have often worked against the cross-sectoral approaches that are necessary for addressing complex environmental challenges and focusing on desirable outcomes.

Transboundary Environmental Issues

Most efforts to understand and safeguard the natural resources and environmental systems of the

Nile basin have traditionally been carried out within the boundaries of individual riparian countries. Many environmental studies, programs and projects have been implemented by national governments with support from international partners. More recently, there has been increasing recognition that key environmental issues are often not limited to single countries, but are regional or global in scope.

For the purposes of this report, environmental transboundary issues are identified as issues that have immediate proximity to and/or impact on neighboring states or on the shared water and/or other natural resource. Also included are issues common to the Nile riparians and which are linked to management of the shared water and/or natural resource.

Several transboundary environmental issues have been identified in the Nile basin:

- *Physical or chemical impacts that can cross national boundaries downstream.* Deforestation and soil erosion can increase vulnerability to drought and lead to increased sedimentation and greater flood risks downstream, while sediments also accumulate in wetlands and reservoirs. Urbanization, industrialization and increased use and improper application of pesticides and fertilizers lead to increased runoff and pollution that harm downstream water users.

. • *Loss and degradation of wetlands and lakes.* Water-dependent ecosystems throughout the Nile basin contribute to the stability, resistance and resilience of both natural and human systems to stress and sudden changes. Significant transboundary benefits derive from various ecosystems‘ roles in maintaining water quality, trapping sediment, retaining nutrients, buffering floods, stabilizing micro-climates and providing storm protection.

. • *Need for transboundary cooperation to protect key habitats.* Many key plant and animal species have habitats in adjoining countries, often requiring cross-border protected areas and other conservation measures for effective management. For example, the Nile is a principal flyway for birds migrating between central Africa and Mediterranean Europe, and Nile wetlands in a variety of countries provide indispensable habitats for these birds.

. • *Lack of early warning systems.* Floods and droughts due to climatic conditions compounded by inadequate land management regularly affect many parts of the basin, causing considerable human suffering and ecological damage.

. • *Spread of exotic and invasive water weeds.* Water hyacinth and other invasive aquatic weeds have spread throughout many parts of the Nile basin, impairing the functions of natural ecosystems, threatening fisheries and interfering with transportation.

. • *Waterborne diseases* such as malaria, diarrhea and bilharzia (schistosomiasis) are among the leading causes of death especially among the old and very young. Their spread is related to a variety of different factors such as increased breeding ground for disease vectors, growing resistance to drugs that fight these diseases, and lack of sanitation infrastructure, often com

pounded by the lack of adequate hygiene education.

Solving or mitigating the impacts of such transboundary environmental issues is most likely to result from carefully coordinated international efforts emphasizing broad consultations, awareness raising and information sharing as well as sound management that includes a combination of preventive and curative measures.

Two particularly notable transboundary environmental initiatives have been launched in the Lake Victoria region of the Nile basin. The Lake Victoria Environmental Management Project (LVEMP) began in 1997 with the aim of restoring the degraded lake ecosystem. This comprehensive regional initiative involving Kenya, Tanzania and Uganda is laying the foundations for a long-term program of investments to help sustain the many and diverse human activities in the

lake and its catchment areas. The LVEMP has received funding from the Global Environment Facility (GEF), the World Bank and the three respective governments. As part of a complementary, longer-term process, the governments of Kenya, Tanzania and Uganda have recently reestablished formal cooperation through the East African Community (EAC), including the formation of an East African cooperation mechanism.[1] EAC is now collaborating with the Swedish government, through the Swedish International Development Agency (Sida), to prepare and implement a 20-year —Strategy for Support to Sustainable Development in the Lake Victoria Region.“ The key areas for regional cooperation are expected to include strengthening emerging networks and institutions, mapping pollution sources and other patterns of unsustainable resource use, priority setting and development of a framework for investment in industry, agriculture, infrastructure, fishery and tourism.

1 Rwanda has recently applied for membership to the EAC.

From Potential Conflict to Cooperation

The Nile holds great potential to foster regional social and economic development through power generation, food production, transportation, trade, environmental conservation, and other related development activities. However, the control and use of Nile waters has long been a source of contention and potential conflict among and between the riparian countries. These tensions have been compounded as growing populations and economic development have led to greater demands for water.

To realize this potential, the riparians have come to recognize that they must take concrete steps to address current challenges and that cooperative sustainable development holds the greatest prospect of delivering mutual benefits to the region. Various subgroups within the basin have engaged in cooperative activities during the last thirty years. In 1996 the riparians initiated, with support from the United Nations Development Programme (UNDP), a forum for a process of legal and institutional dialogue aimed at reaching agreement on core legal principles and institutional arrangements. A draft —Cooperative Framework“ was produced in early 2000, encompassing general principles, rights and obligations, and institutional structure. This draft framework has moved the riparians a long way and important compromises have been reached. However, some key issues remain to be resolved, and the process is continuing.

In 1999 the riparians took an historic step by launching of the *Nile Basin Initiative* (NBI). The initiative is a transitional mechanism that includes all of the Nile countries in a regional partnership to promote economic development and fight poverty. The NBI is comprised of the Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM), a Technical Advisory Committee (Nile-TAC), and a Secretariat (Nile-SEC).[2] The NBI is guided by a Shared Vision — to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile basin water resources.“ This consensus among the riparians has been reinforced by international agreement that the Nile‘s environment and development issues are of global concern.

To translate the shared vision into action, the NBI has initiated a Strategic Action Program made up of two components: the —Shared Vision Program“ (SVP) and the —Subsidiary Action Programs.“ These programs are being developed by the riparians through the NBI together with UNDP, the World Bank and other international partners. The SVP will promote and sustain the Shared Vision and define and undertake a limited range of essential activities to create a

coordinating mechanism and enabling environment for implementation of the Vision, including confidence building and stakeholder involvement, socioeconomic, environmental and sectoral analyses, development and investment planning, water resources management and applied training, and institution and capacity building.

Cooperative management of the Nile River basin is one of the greatest challenges of the global international waters agenda. Focusing on transboundary issues provides the riparian countries with a major opportunity to make significant progress towards their economic and environmental goals in ways that have proved difficult to achieve independently. Identifying the environment and development synergies, and thus the sustainable development opportunities in the basin, is now a major priority. The riparians recognize that future development of the basin must be environmentally sustainable.

2 A more detailed description of the development and structure of the NBI and details of the Strategic Action Program are included in Annex 10.

Transboundary Environmental Analysis

Consensus has emerged in support of a set of activities in the riparian countries to
.(i) provide a strategic framework for environmentally sustainable development of the Nile River basin as part of the SVP;
.(ii) improve understanding of the relationship of water resources development and environment in the basin; and (iii) provide a forum to discuss development paths for the Nile with a wide range of stakeholders.

To take this process forwards, the Transboundary Environmental Analysis was initiated in December 1999 within the NBI‘s basin-wide SVP. The main objective is to help translate existing national environmental commitments and interest into regional and basin-wide analytical frameworks, and eventually basin-wide actions. Funding for this set of activities has been provided by the GEF.

This Transboundary Environmental Analysis report presents an overview of basin-wide environmental trends and threats and recommends a program of complementary preventive and curative actions to address current and emerging issues. The emphasis throughout is on stakeholder awareness and involvement, water and environmental management, training and education, capacity building, information sharing and institutional development. The report also reviews opportunities for mobilization of resources to support the recommended program.

Outputs from two related sets of activities have informed this report. The first consisted of broad and participatory national consultations led by a national expert in each of the nine participating Nile countries, with findings and recommendations documented in national reports.[3] These national consultations were carried out in parallel to assessments of priority needs in

Eritrea did not participate at that point. Eritrea attended the first Council of Ministers Meeting in August 2000, and has indicated that it will start participating in the NBI in an observer capacity.

other sectors included in the SVP, all under the guidance of national Nile-TAC representatives with coordination by an international lead consultant. The national experts consulted with key stakeholders in national and local government agencies, nongovernmental organizations (NGOs)

and research organizations, as well as people working on related projects and programs. At least one workshop was held in each country to which a variety of stakeholders was invited.[4] These consultations built on existing national environmental planning processes within the countries as well as sectoral master plans, many of which were themselves based on broad consultative processes. The second activity, supported by the United States Agency for International Development (USAID), involved preparation of a scoping study for a multi-country technical background paper. This was based on readily accessible and public domain information supplemented by selected country visits organized in cooperation with the national experts referred to above. Key findings from the scoping study have been reflected in the present consolidated Transboundary Environmental Analysis.

This report includes a collective synthesis of basin-wide environmental trends, threats and priorities, based on the two sets of activities described above plus outputs from three basin-wide meetings attended by the drafting group members (see Annex 8) as well as Nile-TAC members. The synthesis provided the basis for identifying a proposed set of national and international actions œ an *Agenda for Environmental Action œ* to be carried out under basin-wide cooperation. Finally, the report identifies the components of a proposed project for the initial implementation phase, to encourage more effective basin-wide stakeholder cooperation on transboundary environmental issues in selected priority areas.

4 The range of stakeholders consulted is listed in Annex 5 and the process of stakeholder participation in the Transboundary Environmental Analysis and in project formulation outlined in Annex 9.

Key Environmental Resources and Their Uses

Geographic Overview. The Nile ba-sin‘s extraordinary variety of geographic and ecological systems resists easy characterization or subdivision. For some countries, such as Rwanda, Sudan and Uganda, the majority of their area is situated within the Nile basin. For other countries, such as D.R. Congo, the Nile basin forms only a very small part of their territory. All of the Nile waters in Burundi and Rwanda and more than half the waters in Uganda originate from within these countries, while most of the water resources of Sudan and Egypt originate outside their borders: 77 percent in the case of Sudan and 97 percent for Egypt on average. The Nile/Lake Victoria basin covers less than 9 percent of Kenya but provides over half of the country‘s fresh water.[5]

The basin includes two main river systems œ the White Nile with its sources on the Equatorial Lake Plateau, shared by Burundi, D.R. Congo, Ethiopia, Kenya, Rwanda, Tanzania and Uganda; and the Blue Nile/Abay and Atbara/Tekeze with their sources in the Ethiopian highlands. The rivers of the Blue Nile system contribute more than twice the volume of water provided by the White Nile system but

An overview map of the Nile basin depicting basin-wide environmental threats is attached to this report. Additional detail is given in the country maps, also attached.

are characterized by extreme variations in the volume of water flow. At its peak, the Blue Nile provides nearly 90 percent of all water reaching Egypt, while during the months of low flow this falls to around 30 percent.

All of the Nile sources are in humid regions with average rainfall exceeding 1,000 millimeters per year. The basin‘s highest rainfall, typically 2,000 millimeters or more, takes place in the mountains to the south and east, but is characterized by high seasonal as well as year-to-year variability. Moving northward through Sudan, rainfall gradually declines to about 200 millimeters a year at the confluence of the Blue and White Niles in Khartoum. Semidesert and desert conditions prevail further north and rainfall drops to practically zero in northern Sudan and most of Egypt. Average and annual rainfall data can be misleading in the arid/semi-arid regions, where the rainy season is less than four months, the rest of the year virtually dry and there are significant year-to-year variations in rainfall.

The River Systems

An overview of the Nile River and its tributaries begins in Burundi with the Kagera, a major river formed by the confluence of two headstreams, the Ruvubu and the Nyawarongo, which are fed by streams rising in the highlands east of Lakes Kivu and Tanganyika. The Ruvubu‘s longest headstream, the 480 kilometer Ruvinzora, may be considered the Nile‘s remotest source. The Kagera River forms part of the boundaries of Rwanda, Tanzania and Uganda before entering Lake Victoria from the west.

The largest lake in Africa, Lake Victoria is also fed by the Mara, Nzoia, Sondu-Miriu and Kuja and other rivers in Kenya and Tanzania. A single outflow, the Victoria Nile, leaves Lake Victoria through the Owen Falls Dam in Uganda, passing through Lakes Kyoga and Albert. Lake Albert also receives water from the Semliki River, which originates in the Mufumbira Mountains in D.R. Congo and flows through Lake Edward to Lake Albert in the Western Rift Valley, forming part of the border between D.R. Congo and Uganda. The main river leaves Lake Albert as the Albert Nile and continues northward into Sudan. Entering southern Sudan at Nimule, the Albert River becomes the Bahr El Jebel (or Mountain Nile) until its confluence with the Bahr El Ghazal and Sobat Rivers near Malakal. Before Malakal the Bahr El Jebel and Bahr El Ghazal both pass through the extensive wetlands of the Sudd. After meeting the Sobat River (called the Baro River in Ethiopia) the main stream becomes the White Nile.

The Blue Nile (Abay in Ethiopia) and its major tributaries, the Dinder and the Ra-had, rise in the Ethiopian mountains. The Blue Nile passes through Lake Tana and a series of dramatic canyons and major irrigation dams at Roseires and Sennar before meeting the White Nile at Khartoum. Beyond Khartoum the Nile is joined by the Atbara River, its last major tributary, which flows from the Ethiopian plateau northeast of Lake Tana and forms part of the border between Ethiopia and Eritrea before entering Sudan. After the Atbara confluence the Nile describes a broad S-curve and passes over three cataracts before entering Lake Nasser (called Lake Nubia in Sudan). Below the Aswan High Dam the river flows northward through Egypt to the head of the delta north of Cairo, where it divides into two main channels before meeting the Mediterranean Sea.

The main feature of the Nile River‘s hydrological regime below the Aswan High Dam is the annual flood. In the northern Sudan, the river usually begins to rise in May, reaches its maximum level in August, and then decreases. The flood is caused by the Blue Nile and Atbara Rivers, whose waters come from heavy seasonal rainfall on the Ethiopian Plateau and contribute nearly 90 percent of the Nile‘s total water supply. The remainder comes from the Lake Plateau of East Africa via the White Nile in a relatively steady yearlong flow that becomes vital when the levels

of the Blue Nile and Atbara are low. These differences are attributable to climatic as well as physical influences œ while the White Nile flows from the south and is supplied by the tropical weather patterns of central and east Africa, the Blue Nile flows from the east and is fed by the typhoons of the Indian Ocean. There is virtually no rainfall in the northern Sudan and Egypt.

The Lakes

The total area of open water in the Nile basin is about 90,000 square kilometers, a vast area but less then 3 percent of the ba-sin‘s total area. Lake Victoria is by far the largest lake at 69,000 square kilometers, followed by the three other major lakes of the East African Rift Valley œ Albert (5,660 square kilometers), Kyoga (5,600 square kilometers) and Edward (2,340 square kilometers). The basins of Lake Victoria and the three smaller lakes to the west œ George, Edward and Albert œ are rich with floodplains, wetlands and smaller satellite lakes that support an abundant diversity of animals and plants and many water-dependent ecosystems. This sub-basin is one of the most important areas in Africa for biological diversity and food production. Downstream from the source of the Blue Nile, Lake Tana has a surface area of 3,200 square kilometers, and the lakes of the Nile Delta cover a further 2,400 square kilometers. Man-made lakes are a significant feature of the lower reaches of the Nile, where Lake Nasser (Lake Nubia) has a potential area of 4,200 square kilometers, making it the world‘s second largest artificial lake.

Lake Victoria is the world‘s second largest freshwater lake in terms of surface area, and is home to more than 300 endemic fish species. The lake provides natural storage for the White Nile, with an outflow through the Owen Falls hydroelectric dam. The lake level is extremely sensitive to moderate changes in rainfall within its basin. The lake floor slopes very gently and even small fluctuations in the water level have serious consequences for the ports, farms and towns occupied by millions of people close to the lakeshore. Lake Victoria acts as a purifier and oxygenator for the Nile River through its large surface area and insolation. Further downstream, the extensive swampy margins of Lake Kyoga further improve the quality of the Victoria Nile and add to the storage function of the main lake.

Lake George in Uganda is connected to the larger Lake Edward shared by D.R. Congo and Uganda. Lake Edward empties northward through the Semliki River to Lake Albert, a shallow body of water averaging about 25 meters in depth. There is a considerable area of lowland at the northern end of Lake Albert where the Victoria Nile enters as a sluggish stream in a swampy delta. All of these lakes and their surrounding areas abound in fish and wildlife. The Semliki River has built up a considerable alluvial plain populated by elephant, hippopotamus, crocodile and various antelope species. The river delta is choked with am-batch (a fast-growing thorny tree) and papyrus, which is steadily encroaching on Lake Albert.

Lake Tana is almost at the top of the watershed of the Blue Nile at 1,800 meters above sea level. With a rainfall of 1,300 millimeters and evaporation at 1,800 millimeters, it maintains its level by inflows from a drainage basin of 16,500 square kilometers where sixty small seasonal streams feed the lake. The lake is fringed with reed-swamp wetlands and has a commercial fishery based on tilapia, barbels and catfish. The lake‘s endemic fish are prevented from spreading downstream by the Tis-Abay Falls. Waterbirds are quite abundant and otters are recorded in the lake.

The Wetlands

Wetlands are among the most productive ecosystems in the world and they cover at least 100,000

square kilometers in the Nile basin. Found at a variety of altitudes, they range from montane bogs and upland valley bottoms, through mid-level swamps and floodplains down to riverine wetlands and eventually to the delta at and below sea level. The Nile wetlands include a variety of swamps, marshes, seasonally inundated grasslands and sedgelands, swamp forests, floodplains and the wetland edges of lakes and rivers. About 3 percent of the Nile basin is covered by wetlands, compared with 2 percent forest and 1.4 percent irrigated croplands. The greatest concentration of wetlands is in Uganda, with around 12 percent of the country made up of wetlands. The 20,000 square kilometers Nile Delta in Egypt includes lakes, freshwater and saline wetlands and intertidal areas as well as large agricultural areas and towns. Of particular importance are the wetlands of Fayoum located on the river system.

The buffering qualities of the Nile wetlands make a critical contribution to maintaining river flows despite strong seasonal variations in rainfall patterns. For example, the Machar wetlands in Sudan receive the floodwaters of the Baro River as well as local rainfall and the flows of numerous torrents from the Ethiopian highlands. This water moves slowly across the marshes in braided channels and small streams to reach the Nile system much later in the season, maintaining the river flow long after the rains have passed. In the same sub-basin, the high altitude wetlands of Ethiopia store water after the rains have ceased and then release it slowly over the dry season into the Didesa River which feeds the Blue Nile, as well as into the Baro River and thence the Sobat and the White Nile. Many Nile wetlands also reduce the energy of stream flows by absorbing their force on the millions of bending reed and grass stems. Papyrus and a variety of other large grasses and sedges provide this service, which is of critical importance during floods. Other wetlands contribute to water quality by trapping sediment among the stems and roots of emergent plants. Water flowing from the agricultural areas of Mount Elgon in Uganda is brown with sediment, while fifty kilometers downstream the water becomes clear after passing through the Butaleja and Tirinyi swamps upstream of Lake Kyoga. Wetlands can also play a key part in purifying wastewater from agricultural, industrial and urban areas. For example, the Nakivubo Swamp receives partially treated sewage from Kampala and manages to remove most of the nutrients and biodegradable pollutants from the city before that outflow reaches Lake Victoria. Finally, wetlands are thought to have an important influence on the local microclimate and large wetlands, like the Sudd, can impact regional rainfall patterns.

The 30,000 square kilometer Sudd in Sudan is the largest wetland in Africa and supports many people, livestock and fisheries. Even though much remains to be understood about the hydrology and ecology of this extensive and valuable wetland, it is clear that the lakes, swamps and marshes of the Sudd do buffer stream flows and thus help spread the flow of the Nile over the entire year. The Sudd consists mainly of papyrus swamps with water grass plus a complex network of channels and lakes œ some permanent and some seasonal. This wetland is extremely flat, with a slope of only 0.01 percent or less for 400 kilometers from south to north. Annual floods are a key feature, gradually expanding and running over the banks of the main Bahr El Jebel River, then sweeping northwards. The permanent swamps become deeper and the seasonally inundated grasslands upon which pastoralists depend become flooded. The floodwaters continue northward and reenter the main river channel, supplemented by the Bahr El Ghazal River. Less than half of the water entering the Sudd flows out of it into the White Nile as a result of evapotranspiration as well as water absorption by seasonally flooded areas. This loss of water from the Nile system has received attention since ancient times, culminating in the proposed 360 kilometer Jonglei Canal to bypass the Sudd with the objective of increasing the downstream flow of the Bahr El Jebel River into the White Nile by 50 percent. Construction of the Canal began in 1978 and was suspended in 1984 due to the civil war in Sudan, with about 240 kilometers completed. In recent years the importance of better understanding the impact of the canal on the Sudd and the people who depend on the wetland ecosystem has been widely recognized.

The Nile basin contains two wetlands recognized by the 1971 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention): Lake Burullus in Egypt and Lake George in Uganda. Several additional Ramsar sites in neighboring basins have important links with the Nile‘s ecosystems, mainly by providing temporary habitats for migrating aquatic birds moving to and from the Nile basin. These include Lake Bardawil in Egypt, Lakes Nakuru and Naivasha in Kenya, and Lake Edward in Uganda, which connects to Lake George through the Kazinga Channel. Lake Nabugabo in Uganda is in the process of becoming a Ramsar site, while Lake Opeta in eastern Uganda and Lutembe Bay on the edge of Lake Victoria may become Ram-sar sites in future.

Biodiversity

While Nile wetlands are critically important, the basin also contains an extraordinary range of other ecosystems. The montane ecosystems of the Rwenzoris and Mount Elgon support unique alpine plants. The highlands of Ethiopia shelter remnants of evergreen montane forests and grass-lands. Even while the gorges of the Blue Nile in Ethiopia are steep and unforested, moist evergreen forest persists in parts of the upper Sobat watershed and the Gam-bella Floodplain contains extensive grasslands and wetlands further downstream at the Sudan border. The mountains around the Lake Victoria basin still retain some isolated patches of native forest. Further north in Sudan, moist and then dry savannas predominate, with many areas of moist woodland among the hills. Eventually the vegetation becomes more scattered and trees are rare, limited to the banks of streams and the main Nile. The Sudd and other large permanent and seasonal wetlands dominate parts of this transitional area before the arid lands of northern Sudan begin. Here vegetation and human habitation become scarce except around oases, and there are many areas with no rainfall recorded for years on end. The Nile‘s main channel then becomes the source of sustenance for flora and fauna through its open water, fringing wetlands and artificial wetlands formed by irrigation. Periodic floods occasionally bring about a localized temporary expansion of plant and animal life.

The Nile basin‘s flora, fauna and ecosystems span several biogeographical areas and biomes. Most important for plant species diversity are the highlands of Ethiopia and two parts of the Lake Victoria basin œ Uganda‘s Mount Elgon and Rwenzori Mountains. These areas are included in the —Afro-montane Regional Center of Endemism (RCE),“ where 75 percent of all species of plants are endemic. Next most important is the rest of the Lake Victoria basin where plant endemism is low (around 3 percent of species) but diversity is high. Both East and West African flora and fauna are represented here in a complex of forests, woodlands, shrublands, grasslands, wetlands and agricultural zones. The White and Blue Nile basins in Sudan between Malakal and Khartoum as well as parts of southern and western Sudan are included in the Sudanese RCE, where a relatively high 35 percent of species are endemic although diversity is much lower. This RCE stretches right across to the coast of West Africa and includes many semi-desert species that are common to both western and eastern Africa. The remainder of the Nile basin is in the Sahel and Sahara zones where both endemism and diversity are low and most plant and animal life is associated with the river channel. European and Mediterranean influences on the flora and fauna in Egypt are especially evident in the Nile Delta.

The diversity of aquatic and semi-aquatic plants is highest in the Ugandan section of the Lake Victoria basin and to some extent in the Sudd and other parts of southern Sudan. The wetlands of these areas are often dominated by different types of papyrus, which populate most Nile wetlands below 2,000 meters above sea level.

Lake Victoria and its surrounding wetlands contain more than 430 fish species, 350 of which may be endemic. The remainder of the Nile basin is thought to contain 115 fish species, with 26

endemic. Combining the basin‘s lake and river fishes gives a staggering total of 545 species, which is rivaled in Africa only by the Congo and Lake Malawi systems. Many species of Lake Victoria fish have disappeared in the last twenty years due to the introduction of Nile perch and tilapia, although these exotics have become the source of a significant export industry.

Savannas are the most extensive ecosystems in the Nile basin and provide a home for the majority of people, livestock and wildlife. Ecologically, these are the richest grassland regions in the world, with a high incidence of indigenous plants and animals, including the world‘s greatest concentration of large mammals.

Equally significant are the dryland ecosystems with their most evident feature being nutrient variability due to precarious and erratic rainfall patterns. This results in highly dynamic biological processes, sometimes involving productive periods of a few weeks or months following rains in between long periods of low or zero precipitation. The dominant plant and animal species tend to be drought resistant, saline tolerant and, in the case of animals, highly mobile and capable of long-distance migration. Moreover, these ecosystems are also characterized by highly adaptive species and high within-species diversity. These patterns become more extreme further north, where between-species diversity is less than in the more humid ecosystems to the south.

Many of the lakes, dams and wetlands of the Nile basin are inhabited by the major species of water-dependent mammals, such as the hippopotamus, sitatunga antelope, otter and marsh mongoose. Important wild herbivores utilize the seasonally inundated grasslands and permanent wetland edges, including waterbuck and three semi-aquatic antelopes œ the white-eared kob, the Uganda kob and the Nile lechwe.

The Nile River system of watercourses and wetlands is a major flyway for migratory birds transiting between Europe and the Mediterranean to the north, and the equatorial district of Lake Victoria and the Rift Valley lakes to the south. At least 125 species use the Nile basin as a flyway between tropical Africa and Eurasia, where they breed during the northern summer. As Af-rica‘s largest wetland, the Nile floodplain is of immense importance to these migrants, particularly the water birds. The crowned cranes (grey and black), wattled cranes and shoebills are four of the more outstanding species.

Whereas many millions of birds pass through or fly over the basin twice a year, there are also many more for which the basin wetlands are a major wintering ground.
Because of the great seasonal variations in water and all of the organisms that inhabit it, especially the seasonal flowering and fruiting of plants, the bird populations are highly variable in the basin. In addition to major changes due to migration there are also local seasonal movements, thus a typical wading species, such as the saddle-bill stork, which normally occurs singly or in pairs, will tend to aggregate at the end of the dry season as its food supply (and predators) becomes more and more concentrated. Other species quit the basin wetlands entirely during flood periods to reappear during the dry season.

Land and Water Use by the People of the Nile

About 160 million people live in the Nile basin and use and depend upon its diverse natural resources and ecosystems in many different ways. While any attempt to group and categorize these uses is hampered by significant limitations in the quality of information available, it is clear that the vast majority of the basin‘s population, except in Egypt, lives in rural areas and depends on subsistence based agriculture, livestock and fishing (Table 1). These economic activities are highly dependent on the opportunities and benefits generated by the ba-sin‘s water-dependent ecosystems.

Five major human use categories for the Nile basin's water-dependent ecosystems can be identified:

- *Rainfed agriculture and agro-pastoralism*, sometimes supplemented by fishing. This includes most of the rural populations of the river banks and floodplains of the entire main Nile north of Malakal in Sudan as well as the Ethiopian highlands, the Lake Victoria basin, the low altitude watersheds of southern Sudan, the Lake Kyoga wetlands and the Lake Albert and Edward floodplains as well as the Congo Rift Valley. The Nile's riverine, lake and wetland areas provide these populations with a significant proportion of their water, shelter, medicines, fuel, fish, plant and animal food, while also supporting floodplain and flood-recession agriculture. The economic value of these ecosystems is considerable; for example, farming households living around the Lake Victoria/Yala Swamp area of Kenya have been estimated to use wetland products and services with an annual value as high as US$220 per capita.

Table 1. Human Dependence on River Basin Components

Land Cover	Area (000 square kilometers)	Area %	Population (millions)	Population Density / square kilometers	Human Use of River Basin Ecosystems
Cropland	325.5	10	32.6	100	Irrigated and flood-recession arable and livestock production, fisheries, wild plants and animals, domestic water supply, transport
Desert/ semi-desert	976.4	30	6.8	7	Dry season pasture, wild plants and animals, domestic water supply
Developed/ urban	32.5	1	29.3	900	Hydropower, domestic and industrial water supply
Forest	65.1	2	0.2	3	-
Grassland	1,366.9	42	27.3	20	Dry season pasture, wild plants and animals, domestic water supply
Irrigated cropland	162.7	5	24.4	150	Irrigated arable and livestock production, fisheries, wild plants and animals, domestic water supply
Shrub	130.2	4	2.6	20	Dry season pasture, wild plants and animals, domestic water supply
Wetlands (includes lakes)	195.3	6	19.5	100	Irrigated and flood-recession arable and livestock production, fisheries, wild plants and animals, domestic water supply, transport
Total	3,254.5	100	142.74	44	

Adapted from —Watersheds of the World, Ecological Value and Vulnerability" Carmen Revenga, Siobhan Murray, Janet Abramovitz, and Allen Hammond, WRI, 1998 and from IUCN.

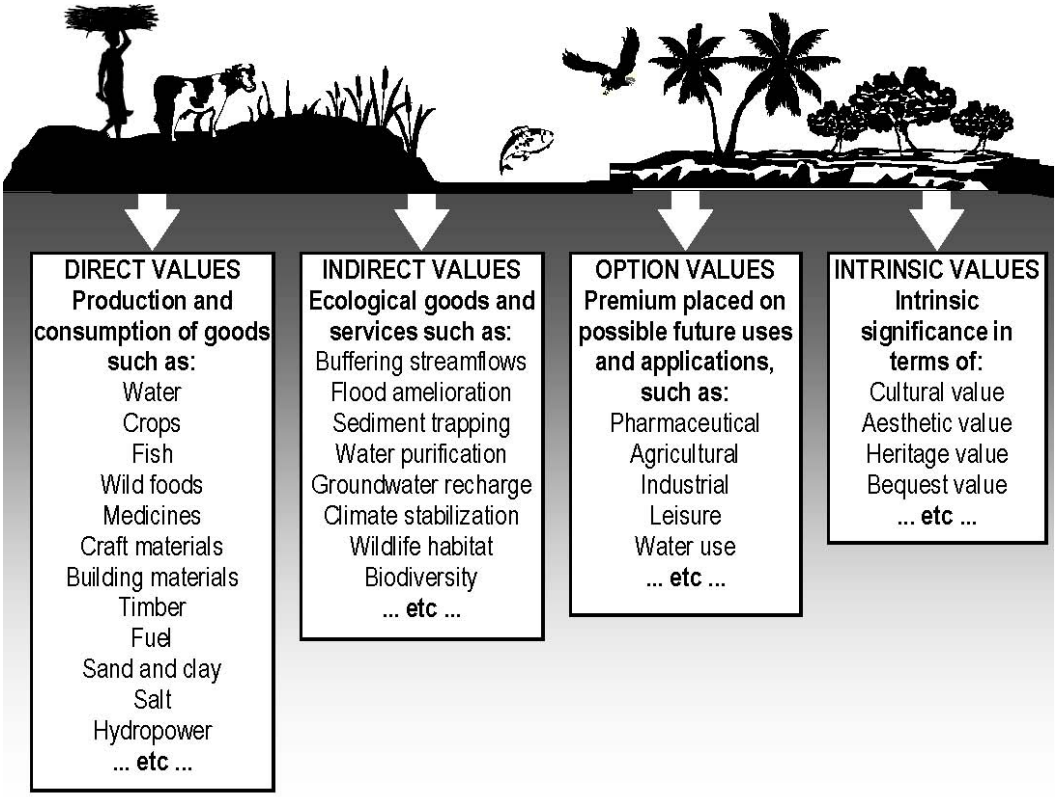
plain cropping. For example, about 500,000

residents depend on the swamps and floodplains of the Greater Sudd for their livestock and crop production, fisheries and wild foods collection. Such water-dependent goods and services have been estimated to contribute almost 80 percent of local communities‘ annual calorie requirements, worth US$200 per household per year.

- *Transhumance pastoralism and live-stock production,* in some cases sup-plemented by small-scale or seasonal livestock production and fishing. This includes people living on the larger-scale irrigation schemes fed by the lower reaches of the Nile in southern Sudan, and lowland popula-tions in Egypt, Ethiopia and Sudan. Souki, White/Blue Nile, New Halfa and Some are permanent residents while Rahad (Sudan); the Nile Delta and the others are seasonal migrants. Water Upper Egypt Irrigation Schemes based resources and ecosystems pro-(Egypt); and to a much smaller extent, vide refuges for these populations in those around Lakes Victoria and Kyoga otherwise arid areas. These refuges in Uganda. Large-scale crop irrigation consist of pasture, water, wild plants, schemes cover over 6 million hectares animal and fish foods as well as support of the Nile basin, two thirds of which for seasonal flood-recession and flood-are in Egypt and one third in Sudan.
- *Irrigated arable agriculture,* sometimes Nile based crop irrigation schemes support large segments of the populations in Egypt and Sudan and agriculture accounts for a substantial part of GDP. To the people living and working on these large schemes the water based ecosystems also provide wild plant, animal and fish foods, fuel and construction materials when these products are otherwise unavailable or unaffordable.

- *Fisheries.* This includes people living around the major dams, lakes, wetlands and river channels, as well as coastal parts of the Nile Delta. Water based ecosystems not only provide the means of fisheries production, but also maintain the fish resources by assuring water quality and flow, protecting fish habitat and breeding areas and œ through flooding œ making seasonally-flooded lakes and wetlands available for fishing activities. About 30,000 fishermen are estimated to catch 150,000 tons of fish a year in the Kenyan portion of Lake Victoria alone, and more than half a million people are employed directly or indirectly in fishery-related activities. Fisheries and related employment and economic activities form an important part of the income base of the countries surrounding Lake Victoria.
- *Urban dwellers* live in thirty major cities in the Nile basin, concentrated around the Lake Victoria basin, along the Nile in Sudan, and the central and northern parts of the Egyptian Nile and Delta area. These people depend directly on the domestic, commercial and industrial water supplies and hydropower provided by the Nile as well as the indirect benefits associated with food production, waste disposal and economic activity in a variety of sectors.

Box 1. Values of Water-Dependent Ecosystems in the Nile Basin: Products, Services and Attributes



Source: IUCN

Indicators of Value for the Nile Ecosystems

The Nile ecosystems generate multiple and wide-ranging benefits (see Box 1 above). These benefits extend beyond the water made available and used for irrigated agriculture, industry, hydropower and household consumption. The basin‘s natural systems provide goods for current and future production and consumption (such as food, fish, medicines, fuel and construction materials) as well as conserving hydrological functions (such as water quality, flow, storage, recharge and flood protection). Components of these ecosystems also have intrinsic value, independent of their economic use, holding aesthetic, cultural and heritage significance for a wide range of stakeholders. Developing a better understanding of the values and functions of the Nile ecosystems can not only help stakeholders understand the importance of environmental protection and conservation, but also provide a basis for improved decision making concerning the use of the Nile ba-sin‘s land, water and other natural resources.

Examples of values based on products, services and attributes of water related ecosystems in the Nile basin include the following:

- *Direct use values* arise from the raw materials and physical products yielded by ecosystems and their component species which are used for production and consumption, and the income, subsistence and employment they support. Direct values of particular importance in the Nile basin include the use of natural habitats and their plant and animal species for cultivation, grazing, food, fuel, fibers, fodder, medicines and transport along the main river channel in dryland areas of the Lower and Upper Nile in Egypt and Sudan and within the primarily subsistence economies of the lakes and wetlands of the upper and mid-course parts of the Nile in Ethiopia, Sudan and Uganda. Significant direct consumption, income and employment sumption, income and employment values accrue from the use of water by

irrigation schemes around Lake Nasser (Lake Nubia) and along the main Nile channel and Delta in Egypt, around Gezira and along the main Nile channel between Khartoum and Lake Nubia in Sudan and around Lake Victoria in Uganda. Commercial fisheries, industrial, urban and rural water consumers also benefit from the direct use values of the Nile, its tributaries and associated wetlands and lakes in all the Nile basin states, as do hydropower facilities at the Aswan High Dam in Egypt, El Roseires, Gebel Aulia, Khasm Eoul Girba, and Sennar Dams in Sudan and Owen Falls Dam in Uganda.

. • *Indirect use values* arise from the ecosystem functions that support and maintain economic activity. These include ecological and hydrological services that protect human populations and natural resources and maintain essential life support functions. Biodiversity, the variability between and within species and ecosystems, also comprises an indirect use value because it permits choice in production and consumption and contributes to the stability, resistance and resilience of natural and human systems to stress, shock and changes. Of particular economic significance in the Nile basin are services provided by water-dependent ecosystems throughout the riparian states which include water flow and assuring sufficient water quality, sediment trapping, nutrient retention, flood control, storm protection and micro-climatic stabilization. All of these values support economic production and consumption activities, in both urban and rural areas, and contribute to the stability and resilience of vulnerable human livelihoods and natural habitats.

. • *Option values* are the expected value of future information from or about natural resources. Option value is usu

ally positive, implying a gain from the decision to postpone development until more information is available on the benefits from conservation. Although extremely difficult to estimate in practice, option value is the premium or value that should be put on a set of biological resources and ecosystems for future use, many of which are currently unknown. For example, the amount and type of genetic diversity that needs to be conserved in wild relatives of domestic plants today in order to support future agriculture is largely unknown. Future options for tourism, commercial, industrial, agricultural and pharmaceutical applications of biological resources are likely to be of most significance in the Nile basin.

- *Intrinsic and other values* include aesthetic, cultural, heritage and bequest significance. This includes wild plant and animal species and particular wetlands with local ritual and spiritual importance (for example the Kipsaina wetlands near Kitale in the Kenyan drainage to Lake Victoria that are used as part of the ceremonies for boys reaching manhood, during which they are encased in wetland mud); national heritage and cultural sites (such as the Aswan High Dam in Egypt, Lake Tana in Ethiopia and sites at Jinja in Uganda); and notable landscapes and areas of outstanding natural beauty, scientific or historical interest (for example the Egyptian Nile and surrounding historical/cultural sites, the confluence of the Blue and White Niles, Murchison Falls and Queen Elizabeth National Parks in Uganda, the Virunga Conservation Area in Congo and Burundi, the cataracts on the Nile, etc.).

The varied and valuable environmental

resources of the Nile basin are subject to a series of threats with significant consequences for future development of the basin. The proximate or immediate causes of these threats have been studied extensively and are reasonably well understood, even though reliable data are scarce and some of the transboundary linkages require further elaboration. Agricultural and grazing lands are being degraded, water quality is declining, wetlands and forests are being lost, overexploitation of

natural resource is continuing, pollution from urban, industrial and agricultural sources is increasing, waterborne diseases are proliferating, and the harmful impacts of floods and droughts are intensifying. Many of these threats have a direct impact on human health and welfare, while others undermine people‘s ability to secure their livelihoods, with poorer people most affected by deteriorating environmental conditions. Collectively, these threats represent a substantial barrier to long-term achievement of sustainable development in the Nile basin countries. A summary of the major threats to the environment of the Nile basin is provided in Table 2[6] and country specific locations of environmental threats are depicted in the respective country maps at

Table 2 summarizes the basin-wide environmental threats described in Annex 1.

Environmental Threats

the end of this volume. An indicative comparison of the relative severity of these threats by country is provided in Annex 2 (Nile Basin Environmental Threats Ranking by Priority and Country).[7]

The driving forces behind the threats to the Nile basin‘s environmental resources are more complex and it is difficult to make generalizations about them with any degree of certainty. Environmental threats have often been attributed to rapid human population growth and persistent poverty, although the linkages between poverty and the environment are intricate and vary considerably from place to place. Looking beyond population and poverty, there is now increasing acceptance that the underlying causes of environmental threats are often related to institutional, governance, awareness and information issues as well as sectoral and macroeconomic policies. Gaining a better understanding of the complex interactions between these factors and the Nile basin‘s environmental resources is critical to the design of effective remedial actions. Efforts that focus on technical aspects of natural resource management and conservation should be complemented by

7 The national experts have ranked the Nile basin environmental threats by priority for each country as illustrated in Annex 2. A table of the specific environmental threats aggregated for five Nile basin subregions is given in Annex 3.

Table 2. Overview of Immediate and Underlying Environmental Threats in the Nile Basin

Root Causes Basin-wide	
Basin-wide	
causes	Policy, governance, institutional and capacity constraints, insufficient environmental education and awareness, limited access to environmental knowledge and information (including relevant scientific data), unclear tenure and inadequate access to resources for local stakeholders, inadequate management of protected areas and other environmental hot spots
Priority Environmental Threats by Country	
Burundi	Deforestation, soil erosion, degradation of river banks and lakeshores, mining, wildlife hunting

D.R. Congo

River and lake pollution, deforestation, soil erosion, wildlife hunting Egypt

Water and air pollution, filling of wetlands, desertification, waterlogging and soil salinity, sanitation, river bank degradation
Ethiopia

Deforestation, overgrazing, soil erosion, desertification, sanitation, loss of biodi versity (including agrobiodiversity), floods, droughts
Kenya

River and lake pollution (point and non-point source), deforestation, desertification, soil erosion, sedimentation, loss of wetlands, eutrophication and water weeds Rwanda

Deforestation, soil erosion, degradation of river banks and lakeshores, desertification, wildlife hunting, overgrazing Sudan

Soil erosion, desertification, pollution of water supplies, wildlife hunting, floods, droughts, sanitation, deforestation
Tanzania

Deforestation, soil degradation, desertification, river and lake pollution, poaching
and shortage of potable water
Uganda

Draining of wetlands, deforestation, soil erosion, encroachment into marginal lakeshore and riverine ecosystems, point and non point-source pollution

parallel efforts targeting policy issues and stream and disruption of natural ground institutional structures that play a key role water recharging. Degradation on arid, in managing those resources in a more sus-semi-arid and subhumid lands leads to detainable and equitable manner. sertification, as desert-like conditions ap

pear where none existed

before. Vast areas **Proximate or Immediate Threats** of thin, sandy topsoil on desert fringes are affected by wind erosion in flatter areas of

Land Degradation the basin.

Rainfed agriculture and livestock grazing There are relatively few hard data measurare the most widespread land uses in the ing the extent of degraded land, in the Nile Nile basin and these activities are associ-basin or elsewhere, but the anecdotal eviated with serious and accelerating envi-dence supporting accelerated deterioration ronmental degradation. Degradation in this in land productivity is compelling. The sense means a diminution of the biological most important causes are deforestation, productivity expected of a given tract of cultivation of unsuitable marginal lands, land being used in a particular way. On a inappropriate or excessive use of agriculfarm, it may be reflected in lower crop tural technologies and chemicals, over-yields, on a savanna in fewer livestock grazing œ particularly in arid and semi-arid units and in a nature reserve in fewer plant lands œ and poor management of cultivated and animal species. The soil on degraded land, often exacerbated by drought. All of lands is typically impoverished or eroded,

these lead to depletion of soil fertility as there is less water available due to in-well as water and wind erosion. Soil erocreased surface runoff or contamination, sion harms productivity by depositing silt plant and animal productivity is lower, and in dams, irrigation systems and river trans-wildlife less diverse. port channels, and by damaging fisheries.

SOIL ERO S IO N impacts include dra-

The results include increasing deficits in

food production, declining food security,

matic increases in the frequency and inten-

and greater human poverty.

sity of floods and droughts, habitat damage
related to sedimentation impacts down

DEF O RE S T A T ION in the Blue Nile basin has been so severe that relatively few forests remain in western Ethiopia or northern Sudan. Forest cover in Ethiopia as a whole decreased from 16 percent to 2 percent of the land area between the 1950s and the late 1980s. The use of former forest and grazing lands for crop cultivation without adequate soil protection has dramatically increased soil erosion, compounded by increasing numbers of livestock being forced onto shrinking pastures. Many people are obliged to drive their stressed livestock long distances in search of water and green pasture, far away from the reach of social services such as health care and education, with the intensified competition for limited grazing and water resources often leading to conflict. Although about 80 percent of the rural population depends heavily on fuelwood, insecure land and resource tenure has provided little incentive for tree planting or protection of forests. About half of the Ethiopian highlands in the Blue Nile basin are now significantly eroded, with some 20,000 square kilometers of agricultural lands having topsoil less than 10 centimeters deep and insufficient to sustain agriculture. By 2010 the extent of such land is expected to increase to around 100,000 square kilometers or almost 20 percent of the highlands. Soil erosion in Ethiopia, together with droughts and pest outbreaks, has led to a 1.4 percent annual decline in per capita agricultural productivity over the last 20 years. Land degradation in combination with erratic rainfall patterns and high population densities throughout the Blue Nile basin severely constrains agricultural production and intensifies food insecurity.

The L A KE VICT ORI A BA S I N is threatened by overgrazing, poor crop cultivation practices, removal of vegetation cover, water quality degradation, uncontrolled development along the lakeshore and river banks, and a range of urban and industrial waste management problems. Deforestation throughout the basin has primarily been driven by the demand for wood for household and commercial fuel, for drying fish, curing tobacco, and baking bricks; wood for use as building materials; and other forest products for medicinal use. This is compounded by pressures brought about by refugees and internally displaced people. Forest reserves have suffered major damage and recent refugee influxes have accelerated forest destruction. Sugar cane, tea and coffee plantations using large quantities of fertilizers and pesticides have replaced large areas of forest, while marginal lands are being overgrazed by livestock. These changes have led to soil erosion, the application of even more agricultural chemicals, and increased flooding and surface runoff causing siltation and excessive nutrient loads in the lake itself.

The KA G E RA BA SIN originally had extensive tropical forests where shifting cultivation systems evolved in response to abundant land, scarce capital and limited technology. But these systems have been unable to cope with recent rapid population growth. Demographic pressures have led to deforestation as wood is harvested for firewood or land is cleared for agricultural production. As a consequence, wetlands that have not yet been surveyed are being taken into use before plans and impact assessments can be carried out. Forest clearing for agriculture has now exceeded sustainable limits in parts of Burundi, D.R. Congo and Rwanda. Associated with population pressure and land clearing are problems of soil erosion as land parcels are subdivided and farmed ever more intensely; soil erosion and depletion are now widespread throughout the basin. Under

these stresses, biodiversity losses are thought to be relatively high, though further studies are needed to confirm this. As population density increases, underscoring the lack of sanitation infrastructure, waterborne diseases are on the increase in many parts of the Kagera basin.

The LOWER NILE RIVER in Egypt is losing 13,000 hectares of agricultural land along its banks each year as a result of expanding settlements, mainly at the outskirts of existing cities. Erosion of the Nile Delta has increased since 1970 when completion of the Aswan High Dam stopped the annual flood with its replenishing sediment. Severe coastal erosion has been observed in several sections of the Delta, while soil salinity and waterlogging of irrigated croplands are increasing, compounded by inappropriate farming practices. Overgrazing and vegetation removal have increased the risks of desertification at the fringes of the basin. Significant areas of irrigated land are affected by desertification to some degree, causing serious productivity losses. In both Sudan and Egypt, sand encroachment from desert onto nearby farmlands occurs, threatening agricultural development, settlements and traffic flows.

Wetlands, Lake Degradation and Biodiversity Loss

WETLANDS in the Nile basin are threatened by drainage (for agriculture, industry and settlements), filling (for solid waste disposal, roads and settlements), dredging and stream channelization (for navigation and flood protection), hydrological alteration (for canals, roads and other structures), groundwater abstraction, siltation, and discharges of pesticides, herbicides, and sewage. All of these reduce the value and productivity of wetlands. In some cases waste loads have increased to such an extent that the wetlands‘ natural capacity as buffer and filter for sediments and certain pollutants is exceeded.

The Nile basin‘s most polluted wetlands are in the Nile Delta, where irrigation drainage water, untreated or partially-treated urban wastes and industrial effluents have destroyed several forms of aquatic life, reduced the productivity of fisheries and contaminated the fish catch. Elsewhere, Uganda‘s rich and extensive wetlands have been seriously degraded by conversion to agriculture, overexploitation for timber (for construction and fuel), papyrus (for construction, fuel and handicrafts), grasses and sedges (for thatch), and wild food plants and medicines. Shifts to use as pastureland followed by overgrazing have caused soil erosion on former reed swamps, while many former papyrus wetlands are no longer able to protect pastures, croplands and settlements from flooding. Other wetlands in Uganda have been lost or degraded by drainage and reclamation for dairy farming and rice growing, by burning, by clay extraction for brick making, by conversion to industrial sites and by pollution from sewage, industrial effluents and garbage dumping, especially in and around Kampala.

Although irrigation schemes often replace wetlands, they can also result in new artificial wetlands. Certain irrigated rice paddy schemes have reproduced some of the same ecological characteristics as natural ecosystems, such as Doho and Kibimba in Uganda and Ahero in western Kenya. This has supported biodiversity conservation to the extent that wetland animals and plants can colonize these schemes without becoming a threat to the crops being grown there.

LAKE VICTORIA AND THE KAGERA BASIN receive significant quantities of raw or partially treated sewage and industrial effluents from rapidly expanding lakeshore settlements. Overflowing pit-latrines and septic tanks as well as contaminated storm water also pollute the lake and its feeder rivers, increasing the incidence of waterborne diseases. Breweries and factories processing sugar, paper and textiles discharge their pollutants directly into the rivers and lake. While pollution management plans have been prepared and implemented by some of the leather tanning, fish processing and sugar factories, breweries and abattoirs along the lakeshore, these are exceptions. Heavily polluting, small-scale gold mining is also increasing in the basin and small quantities of other heavy metals such as chromium and lead have been detected in Lake Victoria.

Lake Victoria itself has undergone substantial ecological changes and deteriorating water quality during recent decades.

The number of economically important fish species in the Lake has declined during recent decades from about twenty species to only two or three, mainly the introduced Nile perch and tilapia. The primary cause of the changes in water quality is not known, although it is probably related to nutrient enrichment. Eutrophication is now considered to be the greatest threat to the lake and the Kagera basin; it has been accompanied by the proliferation of aquatic weeds, including water hyacinth, elephant grass and algal blooms. The greatest contribution of water hyacinth plants to Lake Victoria originates from the Kagera River. Water hyacinth has spread rapidly over an area of several thousand hectares, choking important waterways and adversely affecting fishing, navigation, hydropower generation, water supply, tourism and rec-agricultural purposes; obstruction of waterways, dams, and hydropower generation facilities; and threats to many other lakeshore activities and biodiversity in the lake. Some improvements and a decrease in the extent of water hyacinth mats have been observed in recent years. This has been attributed to various factors, including successful biological weed control supported by the LVEMP, as discussed later in this chapter.

BIODI VER S IT Y L O S S E S are experienced in all the Nile‘s lakes, wetlands, savannas and dry and wet forests (see Table 3). While in Lake Victoria introduction of alien fish and plant species plays the major role, loss and fragmentation of habitat as a result of conversion, destruction or exploitation are the main threats in other areas.

Table 3. Globally Threatened Species (Source: IUCN)

	Mammal Species			Bird Species			Higher Plant Species		
	All	Threatened	Species per 10,000 km 2	Breeding	Threatened	Species per 10,000 km 2	All	Threatened	Species per 10,000 km 2
Burundi	107	5	76	451	6	322	2,500	1	1,783
D.R. Congo	415	38	69	929	26	153	11,000	7	1,817
Egypt	98	15	21	153	11	33	2,066	84	452
Ethiopia	255	35	54	626	20	133	6,500	153	1,378
Kenya	359	43	94	844	24	221	6,000	158	1,571
Rwanda	151	9	110	513	6	373	2,288	0	1,662
Sudan	267	21	43	680	9	110	3,132	8	506
Tanzania	316	33	70	822	30	183	10,000	406	2,229
Uganda	338	18	118	830	10	290	5,000	6	1,762

reation. The main problem associated with water hyacinth is that it forms dense mats of entangled plants which impede light penetration to the waters below and so denies the growth of other plants; decaying water hyacinth mats further reduce oxygen for other organisms in the lake. Increased eutrophication due to the abundance of rotting plants is a major problem in the lake. Water hyacinth mats also lead to increased evapotranspiration, which means that more water is lost than would be from an open water surface alone. The overall impacts include reduction in shore fisheries; interference with all fisheries operations; disruption of water transport; decreased

access to water for domestic, industrial and Pollution is a major threat in the Nile Delta and plays an important secondary role elsewhere.

Most Nile countries have established extensive protected area networks to conserve their most important species, habitats and ecosystems. But these areas have only rarely been adequately protected, mostly because resources for management are inadequate, incentives for illegal encroachment and exploitation are strong, and enforcement has been limited. The majority of important biodiversity assets are located outside formal protected areas, where they receive even less protection.

Water Quality Degradation

The main threats to basin-wide water quality are insufficiently treated domestic, urban and industrial wastes, non-point-source pollution from pesticide and fertilizer residues, siltation and sedimentation, increased salinity and wetlands loss. Increasingly, serious waterborne diseases are prevalent throughout the basin. Toxic and hazardous mining wastes represent dangers in some local areas. The costs of these threats are invariably borne by downstream users. Inferior water quality has a disproportionately large impact on poor households in rural areas and urban slums, where access to uncontaminated water supplies is often limited. Women and girls in rural areas often spend two or more hours per day fetching water due to scarce sources and limited access. The poor are more likely to live in marginal or less desirable areas, such as along polluted waterways and heavily polluted agricultural drains in irrigated areas, in degraded watersheds, and in the vicinity of sewage treatment facilities and wastewater disposal sites. Their propensity to become sick is correspondingly greater, with negative impacts on their work and educational opportunities.

POINT SOURCE POLLUTION is concentrated around settlements and factories and for the most part only serious around urban centers such as Kampala, Khartoum, Cairo and others. Although water quality is still good in most reaches of the Nile basin, pollution from tanneries and textile industries, from mining, manufacturing and other industries is increasing. Although most industrial and urban centers in the Nile basin have sewerage and sewage treatment works, many of these are inefficient or inoperative. As a result, industrial effluents and sewage pass into many parts of the Nile system with little or no treatment. In some midsize towns around Lake Victoria, for example, vegetable oil producers, tanneries, soap manufacturers and other industries discharge untreated or partially treated waste into nearby rivers, which already suffer from problems related to overburdened municipal sewerage systems. As a result, thousands of cubic meters of virtually raw domestic and industrial waste are discharged to Lake Victoria each day. In Sudan, agricultural runoff containing high loads of fertilizers and pesticides, industrial wastes and domestic effluents cause deterioration of water quality in the irrigation drains, especially if discharged during low flow periods. In Egypt the water quality of the Nile declines dramatically on its way from Aswan to the Delta, with decreasing levels of dissolved oxygen and increasing total dissolved solids. The drainage canals that collect water from agricultural areas also receive increasing quantities of untreated or partially treated industrial wastewater, sludge and solid wastes. Concentrations of salts, organic matter, nutrients, fecal coliform, heavy metals and pesticides are high, especially in the most northern parts of the Delta, although there are wide variations locally. Some drains have become completely anaerobic.

NON-POINT SOURCE POLLUTION caused by unsuitable and/or excessive use of agricultural chemicals (fertilizers, pesticides and herbicides) has reduced water quality in many areas. While many of these chemicals are now essential for commercially viable agriculture, their selection and application methods are sometimes inappropriate and cause unnecessary danger. Larger-scale or intensive agriculture generally uses more agricultural chemicals than subsistence and small-scale commercial enterprises, but careful use and effective waste treatment remain rare. These

chemicals enter the river systems, lakes and reservoirs of the Nile basin in considerable quantities, usually without passing the loaded runoff through constructed or natural wetlands. The results have included increased nutrient levels, eutrophication, fish mortality, growth of unwanted organisms, and deteriorating water quality, to the detriment of all users. These problems are particularly apparent in drainage from large irrigation schemes that introduce pesticides and fertilizers into the rivers and wetlands of Sudan and Egypt. Furthermore, agriculture in all five countries of the Lake Victoria basin relies heavily on agricultural chemicals, with similar results.

SEAWATER INTRUSION is only of significance in Egypt in coastal areas, near aquifers in the northern part of the Nile Delta. The Delta covers an area of about 15,000 square kilometers and its aquifers contain about 130,000 million cubic meters of fresh water. Groundwater is pumped for irrigation purposes in large quantities. Overextraction at a rate that exceeds the recharge rate leads to seawater intrusion in the coastal aquifers. As saltwater has a higher specific gravity than freshwater, this results in a freshwater layer of varying thickness above the brackish to saline water. The extent of saltwater intrusion is related to the amount of water being pumped, the recharge rate of the aquifer and the altitude of the water table above mean sea level. Although some unconfined aquifers close to the coast receive considerable recharge from rain and surface water infiltration, excessive pumping still results in saltwater intrusion. The resulting high salinity of the coastal aquifers limits usability of the water.

WATERBORNE DISEASES are causing increasing misery, with high and growing rates of infection and mortality. The most serious are malaria, diarrhea and bilharzia (schistosomiasis), all of which are prevalent throughout the basin. Malaria is the single most important cause of death in most Nile countries. Basin-wide, diarrhea is the major cause of death among small children and is often related to contact with and consumption of drinking water polluted by discharge of partially treated or untreated sewage, compounded by insufficient hygiene education. Significant improvements have been achieved in Egypt in recent years through programs specifically addressing this problem, yet in other parts of the basin death of the young and very old due to intestinal diseases remains a large problem. Bilharzia, which occurs only in slow-moving water, has increased to become the most significant waterborne disease in Egypt since construction of the Aswan High Dam. Other water related diseases widespread in the basin include typhoid, hepatitis, bacterial dysentery, kidney disorders and a variety of intestinal parasites. Sedimentation, the spread of aquatic weeds and slow-moving waters in canals and rivers have all provided favorable conditions for waterborne diseases to proliferate. As close to ten percent of the adult population in Sub-Saharan Africa is currently living with HIV/AIDS and AIDS already accounts for nine percent of adult deaths from infectious disease in the developing world, controlling the threat of water-borne disease will also provide direct benefits to those people living with HIV/AIDS throughout the basin since they are more susceptible to opportunistic infections due to their suppressed immune systems.

SEDIMENTATION problems are necessarily closely related to soil erosion problems. High sediment loads are found in many rivers, especially those draining the mountainous areas that are severely affected by soil erosion. Sediment loads are very high in the Blue Nile, the Atbara and the rivers of the Kagera basin, as well as many of the other rivers flowing into Lake Victoria. These sediment loads from the upper catchment can increase by up to 30 percent during droughts. Sedimentation in the White Nile catchment is also serious although the many lakes and wetlands in the basin do trap much of the sediment and the flatter terrain is somewhat less susceptible to soil erosion. High sediment loads have adverse effects on canals in the major irrigation schemes and can degrade small wetlands and reduce the capacity of shallow lakes. Siltation of major reservoirs imposes direct economic costs by reducing the efficiency of irrigation and power production, sometimes necessitating expensive desilting operations. Sediment and debris carried by the Blue Nile, the Atbara and their tributaries affect water quality in Sudan‘s reservoirs and

irrigation canals, especially the Sennar, Roseires and Khasm El Girba reservoirs and the Gezira, Rahad and Halfa irrigation schemes. The loss of reservoir capacity can be as high as 40 percent (30 percent in Sennar, 10 percent in Roseires and 40 percent in Khasm El Girba). Special procedures are required at Roseires to suspend energy production while flushing the bulk of the sediment that arrives at the beginning of the flood season through the reservoir and dam. Sediment deposition in some parts of the Nile between Atbara and Lake Nasser (Lake Nubia) has formed islands and sediment bars, leading to cross currents that have caused bank erosion and the loss of fertile soil and mature trees. Almost all of the sediment carried to the Nile‘s lower reaches becomes trapped in the Aswan High Dam, a reservoir which is estimated to have a large enough capacity to store sediment inputs for hundreds of years without impairing hydroelectric power generation.

WATER W E ED I N FES T ATIO NS in the Nile basin have increased dramatically in the last two decades. The major cause of proliferation of invasive species is enrichment by nitrogen, phosphorus and other nutrients originating from fertilizer use, sewage discharge and sediments leaching from agricultural areas. Unknown two decades ago, introduced exotic species of water hyacinth are now present throughout the White Nile system. Water hyacinth is choking several of the lakes in Burundi and Rwanda, infesting significant areas of Lake Victoria plus the Victoria Nile system and Lake Kyoga in Uganda and Lakes Albert and Edward in D.R. Congo, and is widespread throughout lakes and wetlands in southern Sudan and canals and drains in Egypt. Water hyacinth has a wide range of impacts, including contributing to eutrophication, increased evapotranspiration, reduced fisheries productivity, disruption of water transport systems, accelerated spread of waterborne diseases, physical obstruction of hydropower and reduced water access for domestic, industrial and agricultural users. Other species of submerged and emergent water plants have the potential to become significant problems in the Nile basin.

Four types of control measures have been attempted: water management (including control of nutrient inputs); mechanical and manual removal; chemical control; and biological control. All have advantages and disadvantages, and none has yet been found to be completely effective. Weed control is made more economically attractive if it can be combined with weed utilization. Eighteen uses of water hyacinth have been identified, and work is proceeding on the commercialization of these products.

In recent years considerable improvements in fighting the progression of water hyacinth have been made, for example in parts of Lake Victoria in connection with the LVEMP, and in Egypt through constant mechanical removal. The LVEMP has promoted and implemented mainly biological means of weed control through raising and release of weevils, as well as mechanical removal. Though it is not easy to single out reasons for the improvement in Lake Victoria, they seem to be related to biological and mechanical control measures as well as to the recent large fluctuations in lake level and the wind and wave action that effectively stranded large water hyacinth mats.

Natural Disasters and Refugees

F L OODING is a serious problem in the Nile basin due to the high variability of both climate and river flows, compounded by the dependence of large numbers of people on the floodplains for their livelihood. Floods have also had some very beneficial effects historically, by increasing land fertility, recharging shallow aquifers and reducing irrigation costs. Four types of floods can be distinguished. The first occurs in the Equatorial Lakes basin, where flashy rivers and localized heavy rainfall in the mountains lead to crop and property damage in the floodplains. The second type occurs around Lake Victoria itself, an area at risk from changes in the lake level; such an occurrence in 19611964 inundated farms, submerged infrastructure and damaged port facilities

and lake transportation systems. Lake Victoria levels have not been stable and the risk of major flooding persists. Floods around Lake Kyoga in Uganda had similar impacts in 1997-1998. Both of these flood events had measurable negative impacts on economic growth, agricultural production and exports, and contributed to an increase in food prices and general inflation. The third flood type takes place in Sudan and Ethiopia, particularly in the Baro/Akobo basin, where exceptional wet seasons cause large-scale floods that damage agricultural crops and irrigation facilities and displace large numbers of people. Floods in 1988 and 1998 were some of the most damaging ever recorded. Extensive damage was caused to crops, livestock, water pumps, wells, canals, roads, houses, schools and health centers. Possible climate change may make such severe flood events more frequent in the future. A final type of flood event occurs in arid areas, where flash floods derived from short but intense storms sometimes result in considerable damage and loss of life. At present there is no integrated flood warning system for the basin.

DROUG HT is a major problem in the Ethiopian highlands and throughout the semi-arid parts of the Nile basin. Sudan has been very seriously affected, with many human and livestock fatalities in a succession of dry years from 1978 to 1987, which also caused three million people to resettle near the Nile and in urban areas. Drought problems in Sudan appear to be increasing due to reduced rainfall (isohyets are estimated to have shifted southwards by about 18 kilometers) and desertification. Ethiopia has experienced at least fourteen major droughts since 1965, with millions of people affected and enormous losses of life in the worst years. Localized droughts occur periodically throughout the basin and have recently been associated with severe hydroelectric power deficiencies in Kenya. While Egypt used to suffer from devastating droughts, the Aswan High Dam has been able to store sufficient water to maintain supplies in very dry years when the only losses suffered have been from reduction in hydropower production and the associated costs of increased thermal power generation. Delayed wet seasons in the more humid, southern parts of the basin have severely damaged crops and livestock. Substantial monitoring efforts have been made in recent decades to provide early warning of impending droughts. Enhanced drought mitigation mechanisms are still needed, however.

REF U G EES continue to flee violence, conflict and poverty throughout many parts of the Nile basin, including Burundi,
D.R. Congo, Ethiopia, Eritrea, Rwanda, Sudan, Tanzania and Uganda. Increasing numbers of people are seeking refuge in safer areas of their own countries or in neighboring countries. Apart from the enormous humanitarian and economic costs involved, the local environmental impacts of these refugees are often sudden, severe and difficult to manage or mitigate. Usually impoverished and lacking access to land, resources or government services, refugees often impose immediate and unsustainable pressure on local natural resources as they urgently seek food, water and shelter. Few of the local or national governments involuntarily hosting refugees are able to provide adequate support.

Root Causes

The preceding description of threats to the Nile basin‘s environmental resources mainly addresses the question of *how* environmental degradation is taking place. While this is essential information, the design and implementation of effective preventive and remedial actions also requires a deeper appreciation of *why* environmental degradation is taking place; in other words, the driving forces behind the threats need to be elaborated.

Sustainable development is based on an adequate balance and consideration of social, economic and environmental issues.
Some environmental problems are associated with lack of economic development. Inadequate sanitation and clean water, indoor air pollution from cooking and heating devices and many types

of land degradation have poverty as their root cause. Here the challenge is to accelerate equitable income growth and promote access to the necessary resources and technologies. But many other problems are often exacerbated by the expansion of economic activity and industrialization. Often social and environmental impacts are not adequately accounted for and as a result most environmental trends associated with rapid industrialization are negative. Pollution from industrial, agricultural and energy production, deforestation caused by commercial logging, conversion and filling of wetlands, and overuse of water are often associated with rapid economic expansion that fails to take account of the value of the environment.

The poorest people are disproportionately affected by environmental degradation in the Nile basin, as elsewhere. The livelihoods of the poor often depend directly on the natural resource base and they have little opportunity to substitute other assets. The poor are therefore particularly vulnerable to shocks arising from rapid environmental change and natural catastrophes. While waterborne diseases are among the leading causes of death in the Nile basin, millions of people are also at risk from expanding dryland degradation and water scarcity. Reducing this human misery is only possible if the environment is able to provide the services on which people depend and if natural resources are used in a way that does not threaten long-term economic development. Environmental damage and overexploitation of natural resources undermine future productivity. Soils that are degraded, aquifers that are depleted and ecosystems that are destroyed in attempts to raise incomes today all jeopardize the prospects for generating higher income levels in the future.

Poverty

Care needs to be taken in citing poverty as a general cause of environmental degradation. Overall, provision of goods and services for and consumption by the non-poor account for most environmental impacts. While increased production and consumption are part of economic development and a productive economy, which will ultimately benefit all people, the additional pressures placed on environmental resources have to be addressed and mitigated through regulatory measures and their enforcement, technological improvement, capacity building in regard to environmental and natural resource management, and increased public awareness.

In general, various evolving industries and big agricultural schemes, whether government run or privately owned, are much more likely to cause large impacts on the environment than small-scale farmers. This is often compounded by subsidies favoring pesticide and fertilizer use and energy consumption, all leading to potential environmental damage and threats to human health. For example, it has been reported that as many as eleven million agricultural workers in Africa alone are known to suffer from pesticide poisoning every year. Also, higher income levels usually are associated with more waste production and energy consumption.

A persistent myth has been that poor countries need to deal first with poverty before they can begin protecting or enhancing the environment. This should not be taken as an excuse to fall into the —grow-now-clean-up-later“ trap. Sustainable environment and natural resource management issues on the one hand, and poverty alleviation and development on the other are not mutually exclusive. Environmental and natural resource degradation need to be addressed as they create immediate challenges for poverty alleviation, pose threats to human and environmental health, and may lead to conflict and natural disasters. Further, it has been shown that the poor are willing to invest considerable resources in the environment and functioning facilities, such as for water and sanitation and energy. Because of the high dependence of the poor on the environment for their livelihoods, failure to tackle both poverty and environmental issues simultaneously threatens the very asset base that the poor need to survive and emerge from poverty.

The factors linking poverty and environment vary from country to country and depend on many factors such as the type of resource use, economy, social factors, climate etc., but there are some common concerns, specifically related to governance, such as property rights, economic incentives, adequate institutions, regulations and enforcement; opportunities; security; and empowerment. In many instances communities lack control over local natural resources as there are no formal or secure land titles or the central government owns the common resources, such as forest, for instance, or prohibits the harvest of wildlife. Under these circumstances the local community has no incentive to manage natural resources sustainably and the result is illegal logging and poaching. Empowering local communities by granting secure usage rights to natural resources can pay dividends in terms of better and more sustainable resource management.

One of the major environmental problems in the basin linked to poverty is land degradation. The poor are often forced onto more marginal or fragile lands because of lack of land or resource access rights and lack of alternative livelihoods. There are no incentives to encourage poor farmers to manage resources in a long-term sustainable manner. In low productivity environments, the surplus is too small to make key conservation or intensification investments necessary to prevent damage to the resource base. Women, who in many cases have traditionally even less access rights to land and resources, are even more vulnerable to poverty. In addition, the poor and landless are rarely consulted in decision making processes regarding land and environmental management policies and strategies. Thus top down land management approaches have often failed as they have seen people as part of the problem rather than part of the solution. An approach involving local communities in land and other natural resource management issues is needed.

Local communities often have an enormous store of knowledge for long-term sustainable land management that is uniquely adapted to their environment. Local people‘s knowledge has long been acknowledged in terms of medicinal plants, water harvesting structures, fishing sites, game trails, non-timber forest products, and seed selection, to name but a few areas. However, this knowledge is still often undervalued, and much more needs to be done to fully appreciate the logic and value of local people‘s resource management practices. Experts often assume that a lack of technical knowledge is a key constraint to management of natural resources by local communities. This overlooks other factors that have diverted poor communities and families from traditional systems such as resettlement of populations, lacking or lost access to land rights, and extreme climatic events. On the other hand, there is often a lack of awareness of the effects of gradual and sometimes imperceptible degradation œ such as the progressive pollution of an aquifer, acidification of the soil, depletion of micro-nutrients, or spread of disease vectors.

Macro and Sectoral Policies

Environmental changes generally result from a series of direct and indirect actions. Among the indirect actions are policy decisions at the national level that filter down to motivate the behavior of people and businesses and influence their activities, which in turn impact the environment. The link between policy changes and environmental degradation or improvement is complex and often has not been fully analyzed. In the case of the Nile basin, the impacts of sectoral policies are likely to be easier to identify relative to the more indirect and longer-term impacts of macro policies.

Policies aimed at improving economic efficiency and growth can transform the environment through macro and sectoral effects. For instance, policies that promote economic growth in countries with inadequate land use planning and regulatory systems can lead to concentration of economic activities, congestion, and increased pollution. Stabilization reforms without accompanying social measures, while seeking to decrease government expenditures can also have detrimental environmental effects in the short term, although macroeconomic instability,

inflation, and high interest rates are more likely to have serious long-term negative environmental impacts. Pro-environment policies can counteract this by creating tax or other incentives for pollution prevention and investment in treatment, or discouraging overuse of environmental goods and services by imposing —green taxes“ on environmental pollution. In general, policies that reduce poverty and provide security of access to resources lead to increased investments in land and more natural resource conservation.

Foreign exchange and trade policies have affected the Nile basin by changing relative prices and quantities of exports and imports. This in turn influences cropping patterns, industrial development and economic growth. The impact of trade policies depends to a large degree on regulatory and governance systems in place to ensure environmental protection, with enforcement of regulations being a weak point in most basin countries. For example, trade liberalization and promotion of export crops contributed to steady growth in Ugandan agriculture during the last decade. Much of this growth resulted from area expansion and not from increases in intensive agriculture and productivity. Thus, in the absence of strict forest conservation policies, liberalization driven growth can encourage deforestation even while frequently related currency devaluations may help sectors such as wildlife based tourism.
Foreign exchange policies can impact soil degradation by changing cropping patterns. For example, in Ethiopia, export-market driven conversions of maize to coffee crops is expected to have a beneficial impact on soils if proper cultivation methods are employed. Similarly, in Uganda, export incentives leading to planting of tree crops such as coffee, cashew, and tea are likely to have stemmed soil erosion. However, these positive impacts may be mitigated by increases in production of other commercial crops such as cotton and groundnuts in Uganda or extension of cultivated areas into forested lands in Ethiopia, both with negative environmental consequences.

Water and air quality are also influenced by trade policies. Lowering of import tariffs in some riparian countries may be contributing to imports and introduction of clean industrial technologies. However, unless pollution laws are implemented, pollution will increase with scaling-up of industrial activities. Thus, the actual impact of liberalization policies depends on the regulations in place in different countries to protect the environment and their capacity to implement these regulations.

Agricultural productivity is low and has been stagnating in many of the Nile riparian countries. Low yields and unclear tenure arrangements have provided disincentives for investment in long-term soil conservation in many of the riparian countries. Expansive agriculture, often extending onto marginal lands, and associated conversion of wetlands and forested areas; overuse of grazing lands and other unsustainable farming techniques have often been the result. In most of the riparian countries, weak input delivery services, inadequate rural infrastructure and poor farming technology have further undermined farming productivity.

Widespread fertilizer use and irrigation have been limited to Egyptian and Sudanese irrigation schemes, where results have included human and environmental health threats due to fertilizer run-off and unsafe pesticide use and storage. Fertilizer use is likely to increase as fertilizer markets are deregulated in the Nile countries. As a macro policy measure, the removal or reduction of fertilizer subsidies does improve market efficiency. Changing prices will create an incentive for appropriate application rates, but reduced access to fertilizers limits agricultural productivity and can potentially lead to further land conversion and shifting agriculture to temporarily increase output. Additional measures are needed to address the need for increasing yields.

A more promising approach to increasing agricultural productivity on a sustainable basis may consist of a combination of measures: first, promoting sustainable farming techniques that use

less fertilizers and pesticides such as integrated pest management; second, combining irrigation with rain water harvesting to conserve water; and third, reducing fertilizer prices by opening up markets to private sector competition rather than subsidizing fertilizers, while safeguarding against human and environmental health threats from fertilizer and pesticide application and storage.

While forest conversion to agriculture is arguable the most important cause of deforestation in riparian countries, dependence on fuelwood and dung for energy also substantially contributes to soil degradation and deforestation. For example, high costs and shortage of hydroelectricity relative to fuelwood have contributed to deforestation in Uganda, and dung used for energy prevents its use as fertilizer and contributes to agricultural productivity loss and agricultural expansion in Ethiopia. Alternate energy supply is key to decreasing dependence on fuelwood and dung. In most riparian countries it is clear that conventional alternates such as electricity are unlikely to be economically viable for all parts of the country. What is required is a policy environment that makes it possible for the private sector to explore and provide various non-wood/non-dung based sources of rural energy.

Environmental policies, which curtail pollution and encourage polluters to internalize the costs of pollution, need to be instituted. Lack of implementation of industrial pollution regulations is a major problem, especially in the Lake Victoria region. Low tariffs on water and sanitation services also contribute to pollution by limiting funds available for infrastructure investments and allowing discharge of inadequately treated waste. Environmental quality standards need to be reinforced with public investments, regulatory mechanisms, and fiscal policies that tax polluters. Harmonization of policies among the riparians will also be central for protecting the Nile‘s shared ecosystems.

Economic growth that results in a decline in poverty and agricultural growth that increases productivity are going to be critical for sound management of the Nile River basin. However, this needs to be complemented with expanded and improved efforts to arrest soil loss, deforestation and pollution. Actions required will include public investments, property rights reform, institutional changes in regulatory agencies, and pricing policies that at a minimum reflect market forces.

Regulatory Environment, Institutional Issues and Land Use Planning

Environmental and natural resource management by state institutions consists of setting priorities, coordinating activities and resolving conflicts, and creating responsible regulatory and enforcement institutions. But administrative capacities in many of the riparian countries are constrained, making environmental and natural resource management particularly difficult. The relatively poor countries of the Nile basin lack effective institutions to certify quality, enforce standards and performance, and gather and disseminate information. Land use planning is often insufficient, zoning regulations are unclear, not all relevant stakeholders are consulted, or existing land use plans are not enforced. This is particularly obvious in urban areas, which tend to grow largely unregulated and without necessary infrastructure. As is frequently the case, the poorest and least powerful citizens of the riparian countries may have the least voice in institutions that control access to and management of local resources. In an effort to ensure greater local involvement and consistent with national decentralization policies, some national governments have delegated responsibility for resource and environmental management to regional or local institutions, although some are not fully equipped to assume this task in terms of staff, training, budgets or legal authority.

Policymaking has frequently outpaced administrative capacity to analyze and implement policies. Laws are enacted and the result is sometimes inconsistent regulations that are beyond the capacity

of responsible government agencies to enforce. Such situations encourage skepticism about laws in general and governments‘ commitment to the environment in particular. It is essential to close the gap between making and implementing policy. That means enhancing the ways environmental issues are handled.

Awareness, Information and Knowledge

Decisions concerning land or water use in the Nile basin have often been made in the absence of environmental awareness or basic information. Lack of awareness and concern for environmental issues permeates all levels of decision making, from local communities to key agencies of the national governments. For example, the large-scale program of establishing wells in the Sahel during the 1960s and 1970s can be directly linked to growing herd sizes and thus to an intensification of land degradation and desertification processes experienced within a 100 kilometer radius of the new wells. Similarly, the horizontal expansion of large-scale mechanized agricultural schemes in some of the Nile basin countries overlooked the age-old and well established traditional nomadic corridors, thus causing far greater concentration of herds in the massive annual migrations and associated land degradation, in addition to greatly increasing the tensions between sedentary farmers and nomadic populations. Lack of awareness, therefore, is an important cause of environmental damage and a serious impediment to finding solutions. When the public, the private sector, civil servants and politicians have a well-informed grasp of environmental issues there is a better chance of developing proactive, preventive policies rather than reacting defensively after damage has been done. Environmental education based on careful analysis can strengthen environmental management and improve sustainability of natural resource use.

There is increasing realization on a broad front that improving people‘s lives, especially the lives of the poorest, requires a solid foundation of information, learning and adaptation. The information revolution makes understanding the relationship between knowledge and economic development more urgent than ever before. Globalization is intensifying competition and attention must be paid to ensure that the poorest countries and communities do not fall behind more rapidly. For the poor, the promise of the new information age and access to knowledge for all may seem far distant. To bring that promise closer to reality, the implications and opportunities of the information revolution must be absorbed into the development and environment agenda.

Population Growth

With or without development, rapid population growth may make it more difficult to address many environmental problems. Seven of the ten Nile basin countries are expected to double their populations between 1995 and 2025. Rapid population growth increases pressures on the natural resource base and often contributes to environmental damage. This is especially relevant in the currently mostly agriculturally based economies of the Nile basin. Traditional land and resource management systems may be unable to adapt fast enough to prevent overuse, and governments cannot keep up with the infrastructure and human needs of a growing population as long as financial resources are lacking. Increasing household incomes and education levels, on the other hand, have been shown to reduce population growth rates. At the same time, the HIV/AIDS crisis, which is prevalent in many of the Nile countries, will lead to rises in death among young, economically active adults and will likely affect national economies. While the infection rate varies, it should be noted that in six of the Nile countries, 8 to 16 percent of adults (age 15-49) are estimated to be infected by HIV. The contribution of the AIDS epidemic will only exacerbate the precarious situation faced by the region.

Another trend associated with population growth and poverty is the increasing move from rural to urban areas. A major pull toward urban migration comes from expanding labor needs of urban based industrial development as this starts to overtake la-bor-intensive agricultural production as a country‘s main economic focus. While benefiting from the opportunities that such employment may afford, the urban poor are most severely impacted by the negative environmental and social trends associated with rapid uncontrolled urban development. The impacts of industrialization and urbanization are discussed in more detail below.

Stagnation of agricultural productivity in the Nile basin provides a particularly clear example of the mutually reinforcing nexus of weak policies, poverty, population growth, and environmental damage. The slowly evolving agricultural intensification that occurred in the first half of the 20th century has been disrupted by political circumstances, poor policies and weak governance, and compounded by the sharp acceleration of population growth during the past four decades. Low agricultural productivity, caused mainly by poor incentives and inadequate services, has encouraged land degradation, deforestation and insufficient fallow periods, all of which further reduce productivity.

Lasting solutions to the diverse problems associated with poverty and rapid population growth lie in policies that improve human skills and access to resources, increase productivity, and raise incomes. Some of the most important opportunities may be found far outside traditional development programs. For example, there is ample evidence that improving education for girls may be the single most important long-term action in terms of addressing population issues; recent studies for Africa as a whole show that a secondary education reduces the average number of children a woman has from seven to three.

Urbanization

Africa‘s combined urban populations are expected to rise from less than 150 million in 1990 to over 500 million by 2020. All of the Nile basin countries anticipate rapid urbanization. In several riparian countries, urban population is projected to exceed 50 percent of total population within the next fifteen years and by 2025 about 40 percent of the Nile basin‘s population will be urbanized.

Urbanization is driven by a variety of factors as discussed above. Development of industries pulls additional labor into urban centers, while declining opportunities in rural areas and an increase in rural poverty also force people to migrate into towns and cities in a quest for better living conditions. Often this has led to false expectations of prosperity as industrialization and increasing income opportunities in the cities have not kept up with the large rural to urban migration.

While urbanization and growth in the industrial sector are associated with a large number of positive factors for poverty alleviation, they also place burdens on the environment and on the urban poor. Sustainable industrialization and urbanization are expected to lead to a rise in GDP, to an inflow of hard currencies through trade, and increased development of local industries as well as countries‘ opportunities to access international markets. Urbanization in general improves overall access to services such as health care and education, while the income earned in cities often supports family members in rural areas. Although urbanization may thereby alleviate pressure on the rural environment by offering income and livelihoods, it brings with it a different set of challenges. Rapidly growing and unplanned urban centers often lack the infrastructure and institutions needed to protect human and environmental health, to supply adequate water and sanitation or to provide affordable housing and transportation. In the mid 1990s, about 65 percent of Africa‘s rural population and 25 percent of the urban population were without adequate water supply while 73 percent of the rural and 43 percent of the urban population were without proper sanitation.

Environmental degradation in rural areas can also affect the poor in urban areas. For example, deforestation, watershed degradation, or soil-eroding agricultural practices increase siltation rates downstream and exacerbate flood-drought cycles. Runoff from fertilizers and pesticides can contaminate downstream water supplies. Because the poor in cities often reside in the most undesirable and hazardous locations, they tend to be more affected by these events than better-off city dwellers. They also have fewer resources to cope with environmental calamities, whether man-made or natural. The urban poor are especially affected by inadequate environmental services and by water and air pollution. While the urban poor also consume products and produce waste that can affect the environment, their per capita consumption of goods and production of waste is much less than for higher income groups. Consequently, the effect of the environment on the urban poor tends to be greater than the effect of the urban poor on the environment.

Climatic Variability

Climate variability, manifested in droughts and floods, has long plagued the Nile basin. The high variability of both climate and stream flows, in conjunction with the large number of people dependent on floodplains, creates the potential for periodic disaster. Droughts and floods have direct effects upon the natural environment, destroying wetlands and other habitat, causing erosion, altering stream channels, and in other ways affecting land and water resource. They have indirect effects through human agency, in the response of affected populations to the need for food, shelter, and fuel brought on by disasters.

Widely differing results of global circulation models show that the state of climate change research does not allow long-term predictions of how Nile flows may be affected. Research does indicate, however, that future hydrological conditions in the basin may differ substantially from those at present. It has been widely speculated in the scientific literature that climate change will lead to change in the frequency and intensity pattern of extreme weather conditions, resulting in an increased frequency and strength of droughts and floods. The consequences of any such increased variability for the Nile basin are likely to be severe. In terms of river hydrology, studies have led to varying results and there are no reliable conclusions. While the effects of climate change are uncertain, negative impacts on the Nile basin may include (i) impacts on ecosystems, such as changes in species distribution and composition, changes in migration patterns, change in local vegetation cover, and wildlife habitat deterioration; (ii) decreased food security, decrease in agricultural production and profitable land use through land degradation, change in forest and range land cover, and increased desertification; (iii) impacts on water resources including change in local water availability and deteriorating water quality especially through increased sediment loads; (iv) impacts on health and settlement patterns in terms of an increase in waterborne diseases and possible increase in urbanization; (v) effect on economy due to the vulnerability of the mostly agrarian based economies in the region to climate change related impacts.

Opportunities and an Agenda for Action

The Transboundary Environmental Analysis has identified and analyzed the priority issues to be addressed at basin-wide, sub-basin, national and local levels. This provided the basis for identifying elements of an *Agenda for Environmental Action in the Nile Basin*, to be implemented over the next decade or more under the NBI's Strategic Action Program in coordination with other development activities. The *Agenda* recognizes the critical need for high-level commitment and improved public awareness in order to achieve successful long-term management and conservation of the basin's natural resources and ecosystems. It emphasizes the integration of environmental and natural resource management concerns into the development process through capacity building, more effective environmental monitoring, assessment and planning with enhanced local participation; through demonstration projects involving the full range of key stakeholders; and through policy reforms.

The *Agenda for Environmental Action* includes a broad range of complementary actions that will need to be carefully coordinated with other elements of the NBI's SVP and the Subsidiary Action Programs,[8]

[8] Within the NBI, Subsidiary Action Programs will consist of investment projects that confer mutual benefits at the sub-basin level, each involving two or more countries. This will allow translation of the Shared Vision into action. There are two Subsidiary Action Programs, ENSAP and NELSAP (see also Annex 10, the Nile Basin Initiative, and Annex 11, Nile Basin Glossary).

as well as the complementary initiatives of other local, national and international partners. The *Agenda* supports the strengthening of institutions and development of human resources required for effective environmental management. The *Agenda* also proposes a series of preventive policy and technical interventions to avoid potential damage to resources; curative measures to address current problems; and resource management programs for sustained use and conservation of resources. The development of applied monitoring programs, use of environmental indicators and conduct of evaluations are recommended to provide routine assessments of the progress made in implementation.

Recognizing the close and complex links between environmental conditions and poverty, the overall objectives of the Agenda for Environmental Action are to:

- Improve people's health by reducing their exposure to environmental factors such as waterborne diseases and aquatic pollutants.
- Enhance the livelihoods of poor people who depend directly on land, water, forests, and biodiversity by helping them secure access to resources and creating circumstances in which they can manage those resources in a sustainable way.
- Reduce vulnerability to environmental risks such as natural disasters, severe weather fluctuations, and the impacts of climate change by providing poor communities with adequate information and empowering them to adapt.

The key findings and recommendations for action from each national Transboundary Environmental Analysis are presented in tables in Annex 4 to allow for comparative review of issues and actions proposed on the national level. The priority activities to be addressed in the initial five to eight year implementation phase of the *Agenda for Environmental Action* on a

basin-wide level are outlined in chapter 5.

AGENDA FOR ENVIRONMENTAL ACTION IN THE NILE BASIN

Political Commitment
High-level commitment
International cooperation

Outreach Activities
Public awareness and education programs
Public participation and consultation
Knowledge and information sharing
NGO involvement

Preventive Measures
Environmental assessment
Integrated river basin (and sub-basin) approach
Early warning systems for floods and droughts
Identification of environmental "hot spots"
Local and national environmental and land use planning
Integrated waste management
Macro policy frameworks for sustainable development
Cost-effective alternative energy sources

Curative Measures
Safe water and improved wastewater treatment
Water quality and industrial pollution control
Expanded integrated waste management approaches
Appropriate pesticide and fertilizer use and disposal
Control of exotic species introduction

Resource Management Programs
Strengthened resource management
Increased local environmental planning
Expanded watershed management
Reforestation programs
Conservation of critical habitats
Strengthened wetland and lake management
Conservation of important species
Reduced navigation risks

Monitoring Environmental Change
Applied Monitoring and Evaluation
Progress Indicators

Political Commitment

High Level Commitment

Effective management and conservation of the Nile's unique environment and natural resources will depend first and foremost on long-term, high level commitment by governments. The prospects for implementing and sustaining the benefits of the *Agenda for Environmental Action*, including the initial activities outlined in the next chapter, have been substantially enhanced by

being embedded within the much broader basin-wide initiative to which the governments of the Nile countries have already committed themselves. The governments see the NBI as offering the possibility to move beyond isolated planning and unilateral actions in a non-cooperative and possibly contentious setting, towards cooperative development planning in the utilization of this transboundary resource, seeking win-win opportunities within the spirit of benefit sharing. The initial basin-wide activities must therefore be seen as a component within a much larger Nile basin strategic action program (see Annex 10). The governments of the region, in making their commitments to the NBI œ including the actions identified through the Transboundary Environmental Analysis œ have committed themselves to finding cooperative solutions to sustainable governance of shared natural resources and further integration. While intangible and unquantifiable, these commitments are the most important elements underpinning long-term sustainability of activities in the Nile basin. The deliberate decision of the Nile riparian countries to self-finance the recurring costs of the Nile Secretariat further reflects this commitment. This measure has been put in place to assure true ownership and control of the process.

Government support will be required to ensure that the priorities established under the *Agenda for Environmental Action* are supported through policy measures, effective implementation of laws and regulations, investment activities and capacity building of regional, national and local institutions. Government support for the *Agenda for Environmental Action* will be critical given the need to take preventive actions that require control of development in sensitive areas, enforcement of existing regulations, and investments to avoid potential adverse impacts.

International Cooperation

The *Agenda for Environmental Action* provides a framework for the riparian states to address management of transboundary environmental issues as an opportunity for regional cooperation. The Transboundary Environmental Analysis will be used to support planning and organization of *Agenda*-related preventive and curative measures and outreach activities within the NBI, to allow for more effective cooperation between parties who share an interest in management of environmental issues that transcend borders at the regional and sub-regional level. In designing activities that address specific concerns in the various parts of the basin, the findings of the Analysis will promote use of a consistent strategy, effective development of joint actions, transfer of experience and opportunities for collective training.

Outreach Activities

Public Awareness and Education Programs

Environmental awareness is key to obtaining and maintaining public support for environmental protection and nature conservation. The extraordinarily large number of stakeholders involved in the basin requires multi-level awareness programs targeting different groups. The *Agenda for Environmental Action* anticipates broad based participation by representatives of the general public, private sector associations, academic and applied research institutions and local community based organizations and NGOs. The active participation of these parties will promote effective dissemination of information to a wide audience, allowing the program to benefit from the experience of others. The most important effect of improved information and environmental education is to change behavior. Well-informed citizens are in a better position to put pressure on government agencies and on polluters and other resource misusers, and are most likely to accept the short-term costs and inconveniences of policies for environmental conservation and sustainable use.

Public Participation and Consultation

Many environmental problems cannot be solved without the active participation of local people. Few governments can afford the costs of enforcing management programs that local people do not accept. Participation can also help with reforestation, wildlife conservation, park management, improvement in sanitation systems and drainage, and flood control. Local people can provide the manpower and knowledge for dealing with the aftermath of environmental disasters, and local knowledge of genetic diversity has led to breakthroughs in crop production. Participatory approaches are essential to ensure that sustainable development options are pursued that meet the needs and aspirations of the stakeholders in the project. Participatory approaches also offer planners a better understanding of local values, knowledge and experience and can help resolve conflicts over resource use.

Among the strengths of community groups and NGOs are their ability to reach the rural poor in remote areas and to promote local participation; their effective use of low-cost technologies; and their propensity for innovation. They work best when they complement the public sector but also have an important awareness and advocacy function. The disadvantages of NGOs include a generally weak financial base and administrative structure and limited technical capacity. Many NGOs are small and by themselves cannot be expected to engage effectively with large populations. Community organizations often require strengthening through technical assistance, management training, and gradually increased levels of responsibility. The challenge is to retain the NGOs‘ expertise and energy while simultaneously enlarging their financial and administrative bases.

Knowledge and Information Sharing

Evidence from around the world demonstrates that the use of broad based dialogue, discussion and participation improves the quality, effectiveness and sustainability of programs and projects. Such dialogue, involvement and consultation provide the opportunity for interested parties to shape and own the development activities that affect their lives. The participation process involves a dialogue with interested and affected parties in review of key issues and decisions related to the programs and projects under development and/or implementation. The Transboundary Environmental Analysis has benefited from the use of these approaches and they will continue to be used at a variety of levels to support the program.

An important element in preparation of the Transboundary Environmental Analysis was the use of a consultation process to support development of the Country Reports. This process showed that both regional and national level consultations can contribute significantly to development of a better strategy that is more firmly based on —facts on the ground“ and can be more readily implemented thanks to broad based support for the recommended interventions. The process also demonstrated effective collaboration and dialogue between representatives of the Nile basin‘s national and local governments, academic and applied research institutions and NGOs in development of program and project activities in support of the *Agenda for Environmental Action*. Expanded use of these approaches will provide local ownership of planned interventions and widespread information for decision makers, user groups and the public about the fragility of land and water resources and measures for their efficient use and protection.

Much remains to be learned about the role of knowledge in economic development and environmental management. The major challenge in the Nile basin environmental context is to find cost-effective and replicable methods of combining local knowledge with experience from other sources and locations, whether national or international. Closing knowledge gaps and

overcoming information failures will not be easy. Access to even the most basic communications technology within the Nile basin is limited. The Nile countries will need to capture the opportunities that the information technology revolution has presented. Rather than re-create existing knowledge, the riparian countries have the possibility to acquire, adapt and communicate much knowledge that is already available, some of it within the basin. Transfer of knowledge should be facilitated as communication costs fall.

NGO Involvement

The participation of international, national and local NGOs will be important for realization of the long-term goals of the *Agenda for Environmental Action*. The Transboundary Environmental Analysis has benefited from environmental information developed at the regional and national level by a number of national and international NGOs. The preparation of the Country Reports benefited from participation of national NGOs in the provision of data, review of threats and identification of recommended actions. Representatives of local and national NGOs also participated in many of the national consultation workshops supporting the Transboundary Environmental Analysis.

Preventive Measures

The timely introduction of enforceable preventive measures can be a very cost-effective approach to reducing the risk of major environmental impacts in the future, especially at priority sites where environmental degradation is still limited. Suggested measures for prevention are discussed below.

Environmental Assessments

The expanded use of environmental assessments in the planning and review of proposed projects is a significant preventive action. Although mandated by many countries in the basin, this approach is not being used on a systematic basis to support environmentally sound development decisions.

Integrated River Basin (and Sub-Basin) Approach

An integrated river basin approach is an incentive based participatory mechanism for solving conflicts and driving collaborative developments with due regard to environmental concerns. Within each of the Nile basin countries there are opportunities to develop collaborative mechanisms involving national agencies that play key roles in management of land and water resources in the various sub-basins. Such mechanisms have the potential to integrate technical, economic, social, legal, and environmental aspects of river basin management. Decision support systems and simulation models can provide important information to support integrated basin and sub-basin planning approaches as well as a framework for identifying and exploring alternative development paths.

Early Warning Systems for Floods and Droughts

The extreme variability of water resources in the Nile basin places added pressure on national and local authorities in forecasting, disaster preparedness and mitigation. Early warning systems can permit advanced actions and to some extent prevent damages from catastrophic events.

The Drought Monitoring Center in Nairobi monitors floods and drought in a number of countries, including Burundi, Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda, while the Intergovernmental Authority for Development (IGAD) Remote Sensing Project uses remote sensing to monitor agricultural production and environmental conditions in the IGAD countries. The USAID funded Famine Early Warning System for Eastern Africa and the Horn monitors rainfall and vegetation as well as El Niño/la Niña events and other agronomy information for eight of the Nile countries. These and many other international, regional and national monitoring mechanisms provide forecasts and enable countries to better plan for emerging crises. However, there is clearly a need for further integration of the various systems together with greater availability of information for decision makers and planners in the basin countries. Collaboration among riparian countries is a prerequisite to devising effective warning systems and to providing benefits for the people of the basin.

Identification of Environmental —Hot Spots“

Future investments in natural resource management and environmental conservation should be targeted towards those locations that are most vulnerable and where the potential for cost-effective interventions is greatest. The most vulnerable —hot spots“ associated with each of the main risks to the Nile‘s environmental resources need to be identified, assessed and catalogued, ideally in coordination with project selection within the NBI‘s SVP and Subsidiary Action Programs as well as within other new programs.

Local and National Environmental and Land Use Planning

All of the riparian countries have prepared a variety of environmental planning documents, including national environmental action plans, national conservation strategies and national biodiversity strategies and action plans. So far, however, relatively few of these national consultation and planning initiatives have been complemented by sub-national plans that can be implemented by local government agencies and other local stakeholders. Local environmental and natural resource use and land use plans are needed to translate the plans and commitments adopted by national governments into viable strategies for resolving land and water use issues on the ground. Land use planning becomes increasingly important where sectors compete, for example around urban centers when siting of industries and urban waste treatment facilities is an issue.

Integrated Waste Management

Growing numbers of countries are devising partnerships with local people to provide municipal environmental services, including sanitation and waste disposal. Dividing responsibilities between users groups, local entrepreneurs and central urban waste management departments has greatly improved the quality of these services. Waste reduction, prevention and recycling are important concepts in designing sustainable solutions.

Macro Policy Frameworks for Sustainable Development

Policy reforms and institutional changes are required to bring about accelerated development and better environmental management. Growing recognition of the importance of taking environmental and social concerns into account while expanding market-based economic reform programs is an encouraging sign, particularly when combined with the trend towards greater transparency and participation in the development process. To further this process, two sets of

policies are needed. First, policies should build on the positive links between development and environment by correcting or preventing market failures, improving access to resources and technology, and promoting equitable income growth. Second, targeted policies are needed to ensure that environmental values are properly reflected in decision making by both the private and public sectors. Two elements of this package are especially important: the removal of distortions that encourage too much resource use, and the clarification of property rights.

Cost-Effective Alternative Energy Sources

There are no easy solutions to the sharp imbalances between the diminishing supply of and expanding demand for energy in most parts of the Nile basin. Efforts to maintain or increase the supply of fuelwood and other energy sources from rural areas have had relatively little success. These need to be matched by efforts to better understand the dynamics of urban energy markets, where much of the demand originates, as an important step towards evaluating realistic and sustainable energy policy options. The increasing urban and industrial energy demand will need to be assessed with a view to regional power production and market opportunities that can increase the available power supply in an environmentally and socially sustainable manner.

Curative Measures

A series of key curative actions are needed to address current resource degradation and pollution. Key issues that need to be addressed through curative measures are discussed below.

Safe Water and Improved Wastewater Treatment

One of the most critical issues is to better manage water resources, including protection of the quality of potable water sources, in order to protect human health and ensure the needs of critical aquatic ecosystems. Successful development and implementation of projects in this sector require the commitment of national/local governments and utilities to undertake institutional, financial and technical measures. Such measures should promote the long-term development of sustainable institutions, including public-private partnership models, which provide reliable services to their customers. Investments in wastewater treatment and pollution prevention should focus on technologies that are reliable under local conditions, take an ecosystem approach, and provide opportunities for full or partial restricted reuse of treated wastewater. Innovative water saving solutions should be explored to prevent the production of waste and wastewater at the source. Investments in technologies and facilities need to be flexible and phased in accordance with local development and capacities.
ment and capacities. Treatment facilities need to be designed so that they can expand in size and complexity with time.

Water Quality and Industrial Pollution Control

While the Nile today is relatively pristine in comparison with other rivers in the world, there are emerging pressures as described above. Establishment of a basin-wide water quality monitoring program is needed, which can facilitate sampling at strategic points of the course of the river. Such data, collected and managed at the respective national levels, and exchanged where appropriate, will allow for improved planning, zoning, development and conservation of water resources. A comprehensive basin-wide overview of water quality and transboundary assessment and action requires establishment of common and accepted methods of measuring key water

quality parameters.

Water quality, which currently is most threatened in the more industrialized areas of the Nile œ such as the Delta, close to large-scale irrigation schemes, and around urban centers in the basin such as Kampala, Khartoum and Cairo œ will be increasingly under stress with growth in local industries and urbanization. To assure a sustainable development path for the basin, measures for pollution prevention and environmental monitoring need to be available, including the technical, regulatory and institutional, and human capacity to implement these.

Industrial pollution affects the lakeshores and river systems of the basin. In many cases major industrial facilities have been sited without regard to their potential environmental impact on water quality or the riverine environment. Environmental standards regulating industrial facilities are not uniformly prescribed or enforced. Institutional and technical capacity may be limited and policy incentives for private sector compliance are at times inadequate. Activities to strengthen and enforce regulatory standards for industry should be supported; new plants should be subject to environmental assessments and existing plants should have environmental audits conducted; cost-effective control technologies should be adopted where absent; and support should be provided for the implementation of pollution prevention and waste minimization programs. National and local authorities should promote regular environmental auditing by industries and implementation of management-oriented applied monitoring programs.

Expanded Integrated Waste Management Approaches

The management of solid waste from household, commercial, industrial and construction activities is a major problem for urban areas and industrial facilities. It is also an increasing problem in the smaller settlements along the Nile and its tributaries, which often lack formal systems for waste collection and disposal. Existing solid waste disposal facilities have often been developed and are operated without adequate concern for environmental factors, endangering groundwater aquifers or causing irreversible damage to wetlands. Measures should be adopted to support properly located and developed disposal sites in the basin.

Waste management often takes place spontaneously through the activities of waste pickers in the informal sector, or through *ad hoc* development by local governments in response to impending or existing waste crises or materials shortages. Though these programs may reduce waste and improve management in a local context, responses and actions have been largely uncoordinated. This could be improved by proactive establishment of programs which address this issue using an integrated waste management approach, where functional aspects such as source reduction, separation, collection, distribution, and disposal are coordinated; waste management activities are organized across space and time; and jurisdictions work together, so that all levels of government and the private sector share the same goals and policies.

Appropriate Pesticide and Fertilizer Use and Disposal

The appropriate use of agricultural inputs in the form of pesticides and/or fertilizers needs to be addressed at the level of policy, technical extension, and improved regulatory frameworks. Significantly increasing agricultural productivity in the basin requires a conducive policy environment as well as targeted management actions, such as for example appropriate organic and/or inorganic fertilizer application, measures to fight agricultural pests and improved land management practices. Policies need to be adopted and enforced to create economic incentives for sustainable agricultural production, including clear land tenure regulations. Knowledge sharing, participation and training for integrated farming techniques need to be supported. Regulations should be strengthened to address unsafe pesticide application practices and disposal, especially of those pesticides that accumulate in the food chain and/or are highly toxic and

therefore pose large risks to human health and the environment. A potential threat to the basin environment that also needs to be addressed is the issue of large storage sites of obsolete pesticides.

The long-term goal should be to move to sustainable farming systems that require reduced inputs in terms of pesticides and assure appropriate fertilizer application practices, reducing costs to human and environmental health as well as to agricultural production. A reform of agricultural and crop protection policy should be comprised of a variety of measures, including adjustment of economic policies and market instruments such as removing of subsidies and biases favoring pesticide use, supporting agricultural extension, and improving the regulatory and enforcement framework to protect the environment and human health. Integrated Pest Management (IPM) constitutes one of these combined approaches. Sustainable farming approaches may alleviate many of the threats and costs associated with high intensity conventional farming, while resulting in comparable long-term crop yields.

Control of Exotic Species Introduction

Exotic species have created serious disturbances in the ecological balance and impacted the use of natural resources in parts of the basin. Among the main concerns are fish species in Lake Victoria and the spread of water hyacinth and other water weeds in the basin. While various factors discussed previously have contributed to improvement in parts of Lake Victoria, additional efforts are needed to fight proliferation of water weeds in many areas. Regulatory measures to prevent further introduction and spread of exotic species are also needed.

Resource Management Programs

Strengthened Resource Management

A major challenge throughout the basin is the strengthening of land and natural resource management. This includes more efficient and less damaging land use practices, the development of more effective programs for sustainable management of forests, wetlands and savannas, and a broad range of measures to support conservation of natural habitats and key species. For example, studies and experience have shown that smaller organizational units, such as villages or resource user groups, are often better equipped to manage their own resources than are large authorities.

Land tenure issues are an important aspect to tackle in resource management programs. Farmers with a clear title to land are more likely to have access to formal credit and to invest more in their land. However, security is not synonymous with individual possession of a formal title. In some of the Nile basin countries greater security could be achieved by strengthening indigenous and customary land rights. The benefits extend well beyond soil conservation by individual farmers. Legal definition and enforcement of group rights have proved important for improving the management of such common property as grazing land.

Increased Local Environmental Planning

Local environmental management plans can provide an overall framework for environmental action, complemented by more specific plans for urban and industrial areas, as well as special plans for management of tourist areas and ecologically sensitive areas including protected areas. To be effectively implemented, these plans should be developed in cooperation with users and stakeholders and should provide agreed mechanisms for the various parties to support sustainable development of the areas. Experience demonstrates that a cooperative process used in

development and implementation of such plans provides an important mechanism to achieve consensus on the use of natural resources and avoids major conflicts between user groups, which can be highly disruptive to the development process.

Expanded Watershed Management

Catchment management through soil and water conservation, reforestation and afforestation, and improved land use practices is especially important in the basin areas where land and water resources are sparse, marginal lands are being increasingly used for cultivation, and steep hill slopes pose a risk for erosion, leading to soil loss and siltation of rivers. Farmers are usually aware of the consequences of soil degradation and erosion for their crop yields. But many projects aiming to help them have failed because they promoted only a single method of soil conservation. The greatest success is realized when farmers can select from a menu of techniques adapted to local circumstances. Agronomic research and project experience are revealing that erosion and resulting sediment loads are best prevented through balanced management of soil moisture, nutrients and organic matter and adapting an integrated watershed management approach. Compared with conventional cropcropping methods, practices such as mulching, manuring, low tillage, contour based cultivation and agroforestry can often reduce surface runoff of water, soil loss and erosion, and reduce sediment loads in the receiving water considerably. They can contribute to control of soil degradation only if practical constraints such as shortages of cash and labor, the use of fuelwood, dung and mulching materials as household fuel, and problems of overgrazing are first alleviated. Rain water harvesting techniques and more efficient water use in agriculture through micro-irrigation techniques, soil improvement to increase water holding capacity, and crop choices will further aid in increasing yield. These soil and water conservation methods are not yet widely used.

Reforestation Programs

Large-scale reforestation programs in the Nile basin have had limited success in mitigating deforestation in state-owned forests. In response, many governments have begun to give local communities and local governments enhanced roles in managing forest resources. Such approaches appear to offer better prospects for stabilizing forest cover; contributing to more sustainable biomass energy supplies; and using locally adapted, integrated resource management. Incentive frameworks to support locally managed forests still need to be strengthened, complemented by support for small-scale and replicable reforestation efforts where local incentives for sustainable management of trees and woodlots are already in place.

Conservation of Critical Habitats

The protection and, where necessary, restoration of terrestrial, wetland and riverine habitats is of highest priority for biodiversity conservation. The integrity of the basin must be taken into consideration and areas that are of regional significance should receive special attention. Both national and regional regulatory systems need to be improved to enhance habitat conservation. Public awareness programs for selected target groups will support habitat conservation efforts.

Management of existing conservation areas should be improved and new areas designated. Some fragile and particularly vulnerable ecosystems will always need to be protected against encroachment and degradation. Many protected areas if not already degraded are acutely threatened with encroachment by farming, logging, and other activities. While the most valuable natural habitats should remain under some form of public ownership, partnerships between government conservation agencies and local communities may provide more promising

management options.

Integrated conservation and development projects build on the principle that local communities must be involved in devising ways to protect parks. When an existing park‘s neighbors are deriving economic benefits from encroaching on it, better alternatives must be made available. Core conservation areas surrounded by multiple-use buffer zones that are managed intensively by local communities to provide income and products are one possible approach, with agreed-on rules of access forming the basis for limiting future encroachment.

The riparian countries need support in finding ways to establish priorities, reformulate policies and operate their protected areas more effectively. Even those that have succeeded in strengthening their conservation institutions have found it hard to coordinate policy, fix the division of labor between local and central authorities, collaborate with NGOs, and devise incentives for efficient management.

Strengthened Wetland and Lake Management

The diversion of water from wetlands should only be done after full assessment of minimal flow requirements and wetland dynamics, and an evaluation of the value and contribution of the wetland to the economy, the environment and the livelihood of those using it. Measures to protect quantity and quality of water entering wetlands should be taken, with special attention to critical periods of water availability for local people and their economy, as well as aquatic and terrestrial species in these areas. Use of wetlands as disposal sites for liquid and solid wastes must be minimized. Important wetlands should be protected from land reclamation and should be included in protected areas. Where viable, traditional conservation systems should be revived and supported. Direct and indirect impacts to the ecological values of wetlands should be considered in all environmental assessments prepared for water resources development programs in the Nile basin. Specific conservation programs for wetlands and other key habitats should be developed, perhaps using Uganda‘s National Wetlands Program as a model. An efficient means of habitat conservation is establishment of a network of multiple use wetland protected areas supported by effective management and planning.

Conservation of Important Species

Habitat and species conservation efforts should be coordinated at the regional level, so that the conservation of migratory species, especially birds, can be achieved and experience and lessons learned shared among countries. This should include networking and information sharing efforts among transboundary parks and protected areas, coordination of near border biodiversity protection efforts, and exchange of experiences and lessons in wetland areas, particularly those included in the Ramsar List. Five of the basin countries are signatory to the Ramsar Convention (Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971) and all basin countries are signatory to the Biodiversity Convention (see Annex 7). The Nile basin is of global importance as a flyway for key migratory bird species and conservation and protection depends on transboundary cooperation of basin countries. Important ongoing efforts through various national and regional NGOs and supported through the GEF, such as the GEF Important Bird Area project (UNDP) and the African Eurasian Flyway project (UNEP), which is currently under preparation, could be linked to more basin countries and expanded.

Reduced Navigation Risks

Actions are needed to reduce the risk of vessel accidents in those lakes and rivers within the basin

where traffic volumes are high. The interventions needed include improved navigation systems and aids, traffic separation schemes, improved port management and more effective contingency measures against oil spills. The largest activity in terms of water based traffic and transport is in Egypt and the Lake Victoria countries. Oil spills through water based transport of oil and fuels constitute an increasing threat, as this is a major means of transportation in the Equatorial Lakes region.

Monitoring Environmental Change

Applied Monitoring and Evaluation

It is not straightforward to assess the effectiveness of interventions with regard to sustainable environmental resource management. Practical means for monitoring and evaluating long-term impact are not always available, and using meaningful indicators beyond immediate project deliverables is often not attempted. Thus the opportunity to objectively evaluate the effectiveness, path and scope of chosen interventions, as well as the ability to transfer and apply lessons learned is missed.

The *Agenda for Environmental Action* includes support for development and implementation of cost-effective applied monitoring and evaluation of programs at the basin-wide and national levels. A review of experience from other regional environmental programs such as those for the Danube River, the Baltic Sea, the Black Sea, the Mediterranean, and the Red Sea and Gulf of Aden, will be used to support development of applied monitoring programs. In addition, links will need to be established with new sister initiatives in the international freshwater field, such as the GEF supported projects on Lake Chad, the Okawango, the Niger, the Senegal, the Mekong and others. Priority will be given to establishment of an affordable program that includes routine and reliable monitoring of parameters to evaluate environmental management activities. The monitoring program will complement ongoing scientific programs to monitor environmental change.

Progress Indicators

In order to support effective evaluation of the programs of the *Agenda for Environmental Action*, environmental indicators need to be established to assess trends and evaluation of progress in addressing environmental management issues at the regional and national levels. These indicators will be designed to include measures of progress in establishment of a regional framework for cooperation, performance of key preventive and curative actions, and assessment of cumulative and specific impacts from operational activities.

Resource Mobilization and Initial Actions

From Planning to Implementation. The most important challenge for all parties concerned with sustainable development and conservation of the unique environment of the Nile basin is to successfully make the critical transition from the planning stage, in which goals and priorities are established, to the implementation stage during which the objectives are incrementally reached on a regional, national and local basis. To achieve this transition, resources from domestic and international sources, both public and private, must be mobilized. The diverse range of actions identified in the *Agenda for Environmental Action* cannot all be undertaken at once; however, with the commitment of the cooperating parties, resources can be identified for key activities to launch the initial implementation phase. Additional activities can begin as success is achieved in this first phase and as more funding becomes available. Resource mobilization should be viewed as a continuous process for the *Agenda for Environmental Action* that will require coordination by the riparian governments over the long term. In this context, it is important to clearly limit expectations concerning the pace at which actions can be funded, as environment and natural resources management are not the only priorities for scarce resources within the region.

Successful implementation of the *Agenda for Environmental Action* requires mobilization of a range of resources œ human and financial œ to support priority activities. A balance between preventive and curative measures must be part of long-term development strategies. Domestic funding, at the national and local level, should be anticipated in most countries to be the primary source for investment activities. These funds can be supplemented by loans and grants from international financial institutions and bilateral donors to support the implementation of priority investments.

Environment and natural resource management programs and investments in the basin have traditionally been funded by national governments, often with support from international and bilateral organizations. In implementing the *Agenda for Environmental Action*, consideration should be given to the new types of resources being used in many countries to support such measures. Especially in municipal services and industry, the private sector should be viewed as a potential partner in investments to provide environmental services on a commercial basis, with appropriate measures to ensure that their activities are environmentally responsible. Full or partial self-financing of management costs for protected areas used by tourists can also be considered. Other non-traditional sources may also be mobilized for selected activities.

Role of International Funding Organizations

In addition to the donor coordination role of the cooperating partners œ UNDP, World Bank, Canadian International Development Agency (CIDA) and other participants in the International Consortium for Cooperation on the Nile (ICCON), specific provisions will be made in the development of the initial implementation phase for partnering of potential international, regional and bilateral funding organizations in program design, implementation, monitoring and evaluation. It is recognized by the NBI and the cooperating partners that these organizations can provide financial support and specialized expertise gained from their participation in other regional environmental programs and individual development projects. The NBI and the cooperating partners plan to seek the active participation of these organizations, at the regional and national level, in identification of investment activities, support to the development of institutional strengthening programs and cooperative preparation of implementation plans and cost estimates for these measures.

Private Sector Participation

Implementation of the *Agenda for Environmental Action* provides an excellent opportunity for strong collaboration between the Nile riparians and the private sector in improved management of the shared water and environmental resources. The private sector has a significant role to play in both preventive and curative actions in all sectors in which it is involved and the formation of an effective —public private partnership“ at the regional and national level is important to the success of the Agenda. Major elements of the *Agenda for Environmental Action* in which the private sector can play an important role include:

. • Expansion and management of water and wastewater services.
. • Solid waste collection and disposal services.
. • Industrial pollution control measures.
. • Development of tourism facilities that are environmentally friendly.
. • In cooperation with regional and national authorities, identification and implementation of measures to reduce lake and river navigation risks.
. • Development of sustainable fisheries practices.

The private sector can also play an important role in providing opportunities and facilities for training experts from regional, national and local organizations concerned with environmental management. Public and private partnerships can also be a major source of support for public awareness and environmental education activities.

Initial Interventions and Proposed Project Components

Initial interventions will address a subset of the *Agenda for Environmental Action* by focusing on developing a framework for

Nile Transboundary Environmental Action Project (Shared Vision Program)

SUMMARY

1. 1. Institutional Strengthening to Facilitate Regional Cooperation
2. 2. Community-level Land, Forests and Water Conservation
3. 3. Environmental Education and Awareness
4. 4. Wetlands and Biodiversity Conservation
5. 5. Basin-wide Water Quality Monitoring

basin-wide environmental action linked to transboundary issues. This framework will be operationalized through a project, the
Nile Transboundary Environmental Action Project. The proposed project has been designed with a phased approach, so that successes can be consolidated subsequent to which further expansion can be envisaged. The project will encourage more effective basin-wide stakeholder cooperation on transboundary environmental issues by supporting priority actions in five main areas: (i) institutional strengthening,
(ii) community-level land, forest and water conservation, (iii) environmental education and awareness; (iv) wetland management and (v) water quality monitoring. The remainder of this chapter outlines the proposed components of the project.

Institutional Strengthening to Facilitate Regional Cooperation

A D E CI SIO N SU PPO RT SY ST E M (DSS) for the Nile basin will be developed to assess

transboundary opportunities for cooperative actions based on common and shared information and data. The DSS will build the technical foundation and enhance the sustainability of environmental and water resource planning and management. This first participatory, basin-wide development effort of a Nile River Basin Model aims at describing, on a regional basis, basin hydrology and river system behavior with adequate accuracy and reliability according to available data. The model will allow assessments of impacts that may have transboundary implications and will provide quantitative river flow information to support more detailed environmental assessments. Broader, multi-sectoral databases and finer-scale models may be developed in subsequent projects to address site-specific issues. The project will support development and application of the planning model within the DSS and provide the environmental content for a comprehensive Information Management System (IMS). The SVP Water Resources Planning and Management Project (see Annex 10) will support the remaining DSS components, including developing the IMS and strengthening institutional frameworks and human capacity for DSS development and application.

A COMMUNICATIONS AND KNOWLEDGE MANAGEMENT sub-component will facilitate basin-wide environmental communication e-mail and internet services, support data and information flow, and establish and maintain an electronic environmental knowledge base and repository for resources and documents. An SVP electronic newsletter will be published and a website established (in Arabic, English, French and possibly other languages used in the region), to communicate best practices, share lessons learned from pilot sites, enable regional access to workshop materials, and provide relevant resource materials for all project components through the DSS.

M A CR O A N D S E C T OR AL P O L I CIES and the environment will be further investigated by one or more leading institutions from within the region. Applied research will analyze the key macro and sector policies œ both national and international œ that have been identified as playing an important role in determining the patterns of economic development and environmental change in the Nile riparian states. These activities will aim to highlight priority laws, policies and regulations where reform could generate net benefits based on environmental as well as economic development criteria.

Community-level Land and Water Conservation

This component includes regional institutional strengthening plus problem identification and site selection activities that build on the transboundary analysis. Together, these activities will provide the basis for planning and implementing com-munity-level actions to be financed by a Micro-Grant Fund. In view of the close linkage to the Efficient Water Use in Agricultural Production Project under the SVP (see Annex 10), this component will be co-managed with that project. Activities under the two projects will be designed to complement and mutually reinforce one another.

BASIN-WIDE CAPABILITIES AND COOPERATION will be enhanced by helping to establish or strengthen national networks of NGOs involved in land and water conservation, especially through information technology training. These networks will facilitate exchange of knowledge and experience among and between national networks, in areas such as organization and management, funding options and sources, access to cost-effective technical solutions, and best practice in community-level land and water conservation. To strengthen and promote government-NGO collaboration, regional workshops for government and NGO personnel will include joint training and information sharing on lessons learned concerning issues such as land and water conservation, eutrophication and water weeds. This will include identification of root causes and mitigation strategies, participatory planning and implementation of projects, identification of areas at risk and cost-effective site-specific mitigation measures.

To improve understanding of TRANSBOUNDARY SOIL EROSION, rapid assessments will be carried out of critical erosion and deposition sites, supported by Geographic Information System (GIS) mapping and further analysis of site-specific root causes. Pilot sites, including reservoirs, irrigation canals and farms, will be selected for erosion control and sediment management interventions, to address catchment area and stream bank erosion and sediment management, all under the Micro-Grant Fund.

A MICRO-GRANT FUND will be established to support local land and water conservation measures at priority transboundary sites (based on the criteria and priorities emerging from the transboundary soil erosion rapid assessment activities outlined above). Priority will be given to actions that focus on transboundary problems and sites, provide for community participation in their design, implementation and evaluation, pay attention to the needs of women and indigenous people and practices, draw on local or Nile basin scientific and technical resources and include provision for capacity development. Emphasis will be placed on pilot initiatives, best practice and exchanges of lessons learned in the following areas: water weed control; land and soil conservation; alternative energies and construction materials; support for local and environmental planning and awareness; and exchange of lessons learned and field visits to demonstration sites. Successful or promising initiatives can be scaled up as a part of the NBI Subsidiary Action Program.

Environmental Education and Awareness

ENVIRONMENTAL EDUCATION AND AWARENESS PROGRAMS will be designed and implemented for use in all riparian countries, to deepen public awareness and understanding of the community of interest and the ecospace that the Nile represents. National working groups will be established to explore optimal approaches to development and dissemination of programs, with representation from key users of environmental education and awareness programs, including relevant government departments, educators and NGOs. Delivery mechanisms will include nature clubs, schools, the scout movement, youth movements, university modules, etc. Materials will be aimed at public and school audiences, emphasizing transboundary links and connections which the Nile naturally forms, using TV, radio and web pages in addition to traditional media, while ensuring these programs complement existing initiatives. Training in the development and implementation of environmental education and awareness programs will be provided.

UNIVERSITIES AND OTHER EDUCATIONAL AND RESEARCH INSTITUTIONS in the riparian countries will be brought into networks to coordinate university programs in environmental science, engineering, and policy studies, to encourage the exchange of students in environmentally related disciplines among the principal universities, and to form basin-wide and sub-basin teams of university based educators and researchers working on issues related to environmental monitoring, geographic information analysis, and knowledge dissemination.

Wetlands and Biodiversity Conservation

This component will promote understanding and awareness of the role of wetlands in supporting sustainable development and will improve management at selected transboundary wetland sites. The emphasis of the entire pilot program is on the management of significant transboundary eco-systems that straddle borders and on important wetlands in the river system.

REGIONAL COOPERATION AND CAPABILITIES will be enhanced through establishment of a basin-wide wetland management network of stakeholder representatives and experts in biodiversity conservation, wetland management, sustainable use of natural resources and sus-

tainable livelihood initiatives involving local communities (to include government officials, protected area managers, NGOs, researchers, etc); and through support of education, training and awareness programs for wetlands and biodiversity conservation. Within these activities, trans-boundary aspects of Nile basin conservation will be emphasized, including habitat and species management, conservation and multiple use management of wetlands, and integration of protected area management with local social and economic development. Three priority sites will be selected for further activities.

To increase understanding and broader awareness of the role of wetlands in supporting sustainable development, ECOLOGICAL AND ECONOMIC STUDIES of two to three selected wetlands will be carried out. These studies will examine wetlands' role in flood control and waste treatment (including the impact of wetland modification or loss), their economic value, and major threats to wetlands and their underlying social and economic causes. The findings of the studies will be used to inform the set of actions described below.

SUPPORT FOR MORE EFFECTIVE MANAGEMENT OF SELECTED WETLANDS will be provided with priority given to wetlands of regional or global significance and transboundary sites that have not received GEF or other donor support. Activities at selected wetlands and transboundary protected area sites will include preparation of site-specific participatory management plans, emphasizing multi-use objectives and where applicable using a consensus building approach among key stakeholders. The status and trends of biodiversity and the related social, economic and institutional issues at each selected site will be assessed. Activities will also include baseline ecological rapid assessments at selected sites; provision for key stakeholders to participate in planning and implementation of management activities; on-the-job training for wetland management staff and sensitization of wetland guards and other staff to local social and economic issues; environmental education and public awareness programs; activities by local communities and sustainable livelihood projects aimed at generating local benefits from conservation and mitigating protected area threats; and support for boundary setting, demarcation, basic facilities, and equipment.

Basin-wide Water Quality Monitoring

This component will make an important contribution to improving water quality monitoring in the basin. One essential outcome will be the establishment of common analytical methods and improved capacities to monitor a limited number of key water quality parameters.

NATIONAL CAPACITIES FOR WATER QUALITY MONITORING will be enhanced. This component will begin with a review of existing national capacities and current initiatives for monitoring point and non-point source pollution. Maps will be prepared showing regular sampling points in the basin as well as known water quality along the river, based on existing data supplemented by the DSS. Common analytical methods for water quality monitoring measurements will be developed, including relevant and realistic surface water quality parameters, together with a quality assurance program and training materials for sampling, data recording and electronic storage. Capacity building for designing national water quality monitoring programs will build on a review of international best practice, covering the selection of sampling points and frequencies, the distribution of sampling points, relevant monitoring parameters for various water uses, minimum equipment needs and other key topics. The methods developed will be tested in one national laboratory in each country prior to broader dissemination. Common formats will be developed for a water quality database in each country, linked to the agencies collecting the data as well as those enforcing environmental laws and regulations in each country. Regional training workshops will be held covering water quality monitoring and related issues such as design and enforcement of related regulations and pollution prevention incentives.

Study tours will provide training to environmental and research institutions, and to private sector industry.

A first BASIN-WI DE WAT E R QU ALI T Y M O N I T O RI NG P R OG RAM will then be initiated at a limited number of key sites in the basin. The selection of initial selected sampling points is likely to emphasize outlets and inflows of major lakes, marshes and other features; selected biodiversity hot spots, such as significant wetlands, migratory birds‘ route and cross-border protected areas; and/or known points of major changes in water quality/quantity. Sampling frequencies, parameters and methods, sampling points and the methods to be used to compile results will all be specified. Additional expenditures for laboratories and measurement and sampling equipment for hotspot areas will require separate financial resources. The identification of long-term sustainable financing of recurring costs for water quality monitoring will be part of the activities within the project.

Management and Implementation Arrangements

Project management arrangements have been designed to provide basin-wide guidance and leadership, to facilitate decentralized project implementation within the riparian countries participating in each component and to coordinate effectively with the activities of the NBI Subsidiary Action Programs as well as other elements of the NBI SVP. The proposed initial basin-wide project will take a programmatic approach. The transitional NBI institutional structure œ comprising the Nile-COM and the Nile-TAC, supported by the Nile Basin Secretariat (Nile-SEC) œ will provide overall policy guidance to the project and ensure regional as well as inter-sectoral integration of the entire SVP.

A Project Coordination Committee will be established to oversee the project, as well as basin-wide Thematic Working Groups (one corresponding to each project component) with representatives from each participating country, to plan and facilitate joint activities, review and evaluate progress, and exchange lessons from national experience. These Working Groups will play a key leadership role in the implementation of the project components. A small Program Coordination Unit (PCU) will implement the project in liaison with the Nile-SEC. The PCU will be staffed by a Regional Project Coordinator, a Chief Technical Advisor, Thematic Lead Specialists for each project component, and support staff.

At the country level one National Project Coordinator will provide a critical link between Thematic Lead Specialists based in the PCU, the basin-wide Thematic Groups, and the national organizations and individuals involved in implementing the various project components within the respective countries. Project implementation will ensure participation of all government and private sector stakeholders, including ministries of water, agriculture, and forestry, local communities, and NGOs.

ike the Nile River itself, this Trans

boundary Environmental Analysis had several identifiable starting points. Perhaps the most significant was the coming together of the riparian nations to form the NBI. This dramatic development was based on the key realization that a cooperative approach to stimulating sustainable development and mitigating poverty in the basin was more likely to be effective than continued national efforts to go it alone. Viewed in the context of the past lack of cooperation and trust that has pervaded Nile River management issues for centuries, the riparian governments‘ commitment to start to work together through the NBI is literally historic; it also offers an extraordinary and unique opportunity to launch a new era of collaboration on Nile basin management as the 21st century begins.

Prepared by the riparians, this Transboundary Environmental Analysis acknowledges and

elaborates on the extraordinary natural and human assets of the Nile basin. In terms of geographic scale, historical richness and ecological variety, the Nile is clearly comparable with any of the world‘s great river systems. Parts of the basin are among the most fertile areas on earth, contributing to the early development of some of the world‘s richest and most important cultures. In environmental terms, the north-south orientation of the

Concluding Comments

river has resulted in a remarkably diverse set of ecosystems, from mountains and highland forests through tropical rain forests, savannas, lakes and wetlands, down to an enormous delta slightly below sea level.

Today, however, the human challenge is immense. More than 160 million people live in the Nile basin. The overwhelming majority of these live in extreme poverty in rural areas, often with lives disrupted by disease, hunger or conflict. The poorest of the poor depend very directly on natural resources for their survival and these resources face some substantial threats. Cumulative human impacts on the basin are seriously degrading the water, soil, plants and animals on which future livelihoods depend. Destructive patterns of resource use œ by the relatively rich as well as the poor œ have proven difficult to change in the face of weak institutions and policies, compounded by a lack of financial resources.

Although the linkages between the environment and human welfare are complex and only partially understood, there is now overwhelming evidence of the need to address environmental issues in the context of economic development and poverty mitigation. This is the approach committed to by the Nile riparians, with support from their international partners, as they start to push forwards with SVP projects in the key development sectors.

The *Agenda for Environmental Action* developed by the riparians from the findings and results of the Transboundary Environmental Analysis represents the first set of cooperative environmental and natural resource management activities to be prioritized over the next decade within a larger set of actions targeting sustainable development. This synergetic approach builds on the recognition that many key environmental issues go beyond national boundaries and are regional or even global in scope. The Nile riparians are now convinced that solving their transboundary environmental issues or mitigating their impacts can only result from carefully coordinated international efforts emphasizing broad consultations, awareness raising and information sharing that complement sound management. The project activities to be carried out during the initial implementation phase for the *Agenda* have been identified on this basis. The coming together of the riparian countries, the establishment of the NBI structure and the collaborative efforts that have generated this Transboundary Environmental Analysis together provide an opportunity to launch an exciting phase of activities on a broad front, so that the work of translating commitments and plans into effective on-the-ground actions can begin.

Annexes

Annex 1

Nile Basin-wide Environmental Threats

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
1. Land Degradation					
Deforestation	• Decreasing vegetation/forest cover; loss of density and diversity • Deterioration of watershed: high run-off associated with increased erosion leading to loss of fertile soils and sedimentation and siltation downstream • Energy crisis associated with price increases due to de	• Land use conversion due to increasing need for arable land and grazing areas; slash and burn practices for land clearing and shifting cultivation • Uncontrolled logging for fuelwood and charcoal production (especially with increased fuelwood prices), construction material and local industry fuel needs	• Poverty and population pressure leading to pressure on resources; absence of alternative livelihoods and weak capacity to increase unit agricultural production • Insufficient energy alternatives to fuelwood • Unsustainable land use practices perpetuated through weak policies and laws and failure to enforce laws and regulations; lack of forest protection	Basin-wide Critical areas: • Burundi: along Ruvubu River and other river basins, along steep slopes of high mountains • D.R. Congo: Territories of Beni, Lubero, Rutshuru and Irumu; Virunga National Park • Border area between D.R. Congo, Rwanda, Uganda • Ethiopian highlands	Severe
A.	creased availability of fuelwood and charcoal • Large scale habitat destruction and loss of wildlife in terms of numbers and biodiversity; progressive disappearance of National Parks • Variability in local climate and rainfall patterns	• Unsustainable and inefficient resource use (e.g. overgrazing, extensive cultivation on steep hillslopes and uncontrolled logging) • Lack of local planting/ replanting • Human migration and resettlement; encroachment into forested areas	• Insufficient awareness and knowledge of sustainable land use practices and effects of deforestation • Land tenure system leading to allocation and use of marginal lands and lack of incentives for sustainable land use practices • Large number of refugees and resettlements without basic support • Drought and overall arid climate and topography	• Rwanda: Nyungwe National Forest, Gishwati Forest • Sudan: Nile basin south of Khartoum, Atbara River, Blue Nile • Tanzania: Several divisions in Mwanza region; some districts in Kagera region • Uganda: Mt. Elgon and Rwenzori areas; SW high-lands	

1 Relevant locations are indicated on the country maps attached to this report.

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
B. Soil Erosion	• Loss of top soil and reduction of soil fertility leading to decrease in agricultural production and food security • Reduction of vegetative cover and loss of habitats and biodiversity • Water quality degradation from high sediment loads, sil-tation of shallow lakes, wetlands, reservoirs, and low lying lands downstream • Degradation of river beds and river bank erosion; desertification and wind erosion (northern arid regions); sheet and rill erosion and gully formation (after heavy rainfall) in highlands • Landslides and flooding leading to destruction of infrastructure (houses, means of communication, communal facilities)	• Massive continued loss of vegetative cover due to deforestation and loss of other land cover, deterioration of catchment buffer zones • Inappropriate agricul-tural practices leading to decreased soil quality and erosion, such as use of mar-ginal lands, overgrazing and free grazing • Lack of soil and water conservation measures and/or abandonment and poor maintenance of anti-erosion works • Bush fires and slash and burn practices	• Population pressure and poverty leading to unsustainable land use practices • Topography (uneven re-lief, high stream flow velocities) and rainfall patterns (floods, droughts, climate variability) • Lack of land use policies and improper land use management; weak extension service on soil conservation and lack of incentives for conservation often connected with prevalent land tenure system • High livestock density • Lack of awareness of land-water interaction • Lack of EIAs or systematic implementation of EIA for infrastructure projects due to lack of financial and human resources	Regional Critical areas: • Burundi: Ruvubu River region, steep slopes/ hillsides • D.R. Congo: Lubero; near Kasenyi (south shore of Lake Albert) • Egypt: River bank/river bed erosion north of Aswan High Dam • Ethiopia: Blue Nile and Tekeze area, Baro and Akobo region • Kenya: Trans-Nzoia district; Uasin Gishu district; Kakamega/Vihiga dis-tricts; Kisii and Migori districts; lakeshore • Rwanda: Runyinya, Mu-rama, Bulinga, Nyamutera, Kibali • Sudan: Sobat region; along Blue Nile; Atbara region; wind erosion along main Nile (Nile State and Northern State) • Tanzania: Steep hills in Mwanza, Mara, and Kagera region; lakeshores • Uganda: Mt. Elgon and Rwenzori and SW mountain areas	Severe
C. River Bank and Lakeshore Degradation	• Destruction of vegetative cover especially in riparian and lakeshore buffer zones • Erosion, landslides, and downstream sedimentation leading to change in river course • Adverse effects on riverine aquatic life and lake ecosystems	• Poor land use and agricultural practices such as dry season cultivation near banks and destruction of vegetative cover to increase arable land area; high animal density • Drop in water levels and drying up of waterways • Increased urban development and construction and industrial activities near river banks; poorly planned tourism centers	• Lack of or insufficient national land use plans, laws and regulations, and/or enforcement of existing laws • Population pressure and rapid growth of urban centers • Expansion of farm lands and inadequate agricul-tural practices near river banks and shores, including overgrazing • Land subsistence; relief and morphological structure of soil • Climatic variability and conditions; seasonal floods and intermittent increase of lake levels	Mostly sub-regional Critical areas: • Burundi: Lake Cohoha • Ethiopia and Sudan: Atbara and Sobat, Blue Nile and tributaries; main Nile (Sudan) • Egypt: Nile below Lake Nasser • Rwanda: Nyabarongo River • Tanzania: estuaries of rivers into Lake • Uganda: Severe in seasonal wetlands near shore of Lake Kyoga	Moderate to severe

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
D. Mining Impacts	• Water and air pollution • Soil degradation and erosion of sites and adjacent river banks; deforestation and landslides leading to river siltation • Adverse impact on flora and fauna	• Use of toxic chemicals and lack of containment and treatment facilities (esp. mercury use in gold mining) • Lack of or inadequate site rehabilitation • Inadequate mining practices • High demand for construction materials and indiscriminate clearing vegetation	• Inadequate policy guidance, lack of or insufficient safeguards (EIA, anti-pollution/ environmental legislation) and enforcement • No regulation/ enforcement of private mining entrepreneurs • Lack of (government) planning and oversight	Localized- Mining operations in the Basin include gold, coal, copper, diamond, iron ore, phosphate, managanese, tin, wolfram and zinc mines. Critical areas mainly: • Burundi: Kibira • D.R. Congo: Irumu, Mahagi, and Aru regions • Rwanda: Bisesero, Rutsiro, Gatumba, Rutongo, Nyakabingo, Nemba, Rwinkwavu, Musha • Tanzania: Mara, Mwanza, parts of Shinyanga, and Kagera regions • Sudan: Gissan and Kurmuk on Blue Nile and in northern Sudan; north of town of Atbara • Uganda: Lake George area (past copper and current cobalt processing)	Overall low Severe in certain locations
2. Water Quality Degradation					
A. Pollution (point and non-point source)	• Degradation of water quality, render-ing water unsuitable for domestic, agricultural, industrial and other uses • Adverse impacts on water-dependent flora and fauna; loss of habitats and bio-diversity; nutrient discharges leading to increased eutrophication • Pollution of lakes and tributaries, resulting in contamination of drinking water • Lack of adequate liquid and solid waste disposal systems and accumulation of refuse • Decrease in environmental quality, disappearance of natural habitats and proliferation of water hyacinth	• Discharge and run-off of untreated water from urban and industrial sources containing dissolved nutrients, industrial pollutants, agricultural chemicals/fertilizers; lack of recycling of waste matter; uncontrolled dumping of waste • Non-point source pollution from agriculture due to improper and high application rates of agro-chemicals • Degradation of vegetative cover especially riparian buffer zones and wetlands in basin which could act as filters	• Weak policies, laws and regulations for environ-mental protection (e.g. EIA); insufficient enforcement and monitor-ing especially in respect to industrial facilities; low budgetary provision for enforcement of exist-ing regulations; lack of sufficient human resources • *Point Sources:* Inadequate funding of investments; high capital costs; high operation and maintenance costs; inadequate containment and treatment of wastes and lack of sanitary facilities • *Non-point sources:* Unsustainable land use practices in combination with lack of security of land tenure • Inadequate zoning regulations and/or enforcement; inadequate environmental and land use planning • Low environmental awareness and sense of value of environmental protection	Basin-wide œ Critical areas: • Point source pollution: localized around urban centers, such as Kampala, Khartoum, Cairo and other urban centers in Egypt • Non-point sources: regional problem mostly from agricultural sources. Hotspots include large irrigation schemes in Sudan and Egypt, and nutrient pollution from agricul-tural areas around Lake Victoria and its tributaries	Moderate

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
B. Sanitation ConcernsœWaterborne Diseases and Environmental Health	• Pollution of drinking water sources (ground and surface water) and high dis-solved nutrient loads resulting in in-creasing eutrophication and spread of infectious diseases (diarrhea, malaria, bilharzia, dysentery, intestinal worms) • Risks to public health due to poor sanitation condi-tions, especially during rainy season and floods • Increased absence from work due to sickness; increase in malnutrition and death rates especially among vulnerable groups such as small children, the displaced and the elderly	• Lack of water supply systems and/or other reliable drinking water source; drinking water contamination with fecal matter leading to spread of pathogens • Lack of or insufficient sewerage or alternative sanitation sys-tems; leaks and insufficient maintenance of existing fa-cilities; lack of urban stormwater sewers and solid waste dis-posal facilities • Insufficient sanitation and hygiene training in conjunction with widespread poor sanitary conditions • Increased breeding ground for mosquitoes in water weed infested areas and irrigation canals	• Lack of environmental regulations and laws, monitoring and en-forcement and general waste management strategies • Rapid growth of urban centers and lack of fi-nancial resource base to build needed water supply and sanitation infrastructure, combined with lack of planning for urban expansion and required infrastructure • High capital costs for in-vestments; high operation and maintenance costs • Previous low priority given to sanitation by government and agencies; lack of awareness of connection between sanitation and safe drinking water; need for better hygiene education • Poverty and poor health condition of large parts of the population	Basin-wide œ localized Critical areas: • All large urban centers, such as Kampala, Khar-toum, Cairo and urban centers in Nile Delta • Rural villages (local threats)	Severe
C. Eutrophication	• Algal blooms and increasing invasion by water weeds • Decreased water quality • Change/reduction in fish stock	• Discharge of nutri-ents from domestic and industrial waste water-sources and agricultural run-off • Degradation of catchment area especially wetlands	• Inadequate environmental provisions in planning of industrial and urban centers • Land degradation • Overuse of agro-chemicals • Poor land use and farm-ing practices	Regional, sub-basin Critical areas: • Lake Victoria region, including Kagera basin (lakes and river), • Urban areas in delta area in Egypt	Moderate

D. Water Weed Infestation	• Continuing spread of weeds and infestation of lakes and rivers, eutrophication • Interference with ecology and economy, e.g. mats on water surface impair navigation and fish-ing activities and lead to decrease in fish yields as well as to eutrophication • Decrease in diversity of certain fish species • Increase in occur-rence of waterborne diseases; increased water evaporation	• High dissolved nutri-ent levels from pollutant discharge from industrial and domestic sources and agri-cultural run-off due to poor land use practices and lack of water treatment • Inadequate response mechanisms	• Introduction of hyacinth; insufficient preventive measures against intro-duction of foreign species in general • Lack of capacity in water resources and environment departments in some countries resulting in insufficient enforcement of environmental regulations • Delay in mobilizing funds and creating na-tional/regional programs to combat infestation	Regional Critical areas: • Burundi: Ruvubu River, Lake Cyohoha and Rwi-hinda • D.R. Congo: Lake Albert (severe), Lake Edward (moderate) • Kenya: Winam Gulf (Lake Victoria) • Rwanda/Tanzania/ Burundi: Kagera River • Rwanda: Lake Cyohoha, Lake Rwero, Nyabarongo River, entire stretch of Kagera • Sudan: White Nile south of Jebel Aulia dam • Tanzania: Southern shore of Lake Victoria, especially in bays of Mara and Mwanza regions • Uganda: Lake Victoria, Lake Kyoga and Victoria Nile	Severe in certain ar-eas

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
E. Siltation	• Decreased life span of dams and reser-voirs as well as sil-tation of flooded fields, plains and irrigation canals; additional threat often associated with toxic pollutants adsorbed in silt parti-cles • Siltation leading to decrease of wet-lands and reduction of beneficial functions and uses • Heavy silt loads in water bodies; sedi-mentation leading to formation of sand bars, changes in river course and river bank erosion	• Climatic conditions and topographic fea-tures upstream (heavy rains and steep slopes) as well as land practices re-sulting in catchment degradation and soil erosion (such as en-croachment for agricultural purposes)	• Inappropriate land management practices and lack if soil conservation practices often perpetuated by specific land tenure systems; deterioration in catchment through deforestation (see above) • Lack of stringent enforcement of environmental regulations and policies • Lack of awareness of link between land based activities and water pollution	Basin-wide œ localized Critical areas: • Burundi: Shallow lakes in the NE • Egypt: Aswan High Dam reservoir • Ethiopia: Finchaa, Tekeze • Kenya: Lower reaches of Yara, Nzoia, Kuja, Sondu-Miriu, Nyando • Sudan: Roseires, Sennar, Khasm El Girba reservoirs; Gezira, Rahad and new Halfa irrigation schemes; main Nile • Tanzania: Mara River, Simiyu River, Shinyanga and Mwanza regions • Uganda: Nile River system especially Kioga	Moderate to severe (depend-ing on lo-cation)

3. Disaster Preparedness and Remediation

A. Floods and Droughts	*Floods* - • Direct impacts include loss of life and property (crops/ livestock and arable land, housing, infrastructure); other results are food insecurity (availability and increased prices), loss to economy and environmental impacts *Droughts* • Direct impacts are food insecurity, famine and human mi-gration; long-term impacts include change in water availability (e.g. permanently dried springs, perennial rivers becoming seasonal) *Floods/droughts* • Dislocation of people and problems associated with high number of disaster victims such as food insecurity and high incidence of water-borne diseases	*Floods* • Heavy rainfalls in conjunction with specific natural terrain features, increased by certain land use practices; lack of planning of urban settlements to prevent settlement in flood prone areas, aggravated by by population pressure and lack of land ownership *Droughts* • Long/prolonged dry season resulting in water shortage, aggravated by improper management of land and water resources (e.g. deforestation, overgrazing) leading to decrease in vegetative cover, water retention capacity, and groundwater recharge; and increased desertification *Floods/droughts* • Poorly equipped meteorological services and lack of efficient and reliable early warning systems contributing to lack of disaster preparedness	*Floods* - • Irregular and large seasonal and year to year variability in rainfall patterns increased by climatic changes; mismanagement of land and water resources leading to soil erosion and increased run-off *Droughts* - • Climatic zone/ geography; effects from El Niño	Regional Most critical areas: *Floods* - • Blue Nile and Atbara from Ethiopian highlands to Lake Nasser • Flash floods in wadis in dry areas (e.g. between Aswan and Cairo) • Floods from recent rise in Lake Victoria lake levels • Gambella plain in Ethiopia, lower river reaches in Kenya (Nzoia and Nyando River) *Droughts œ* • Severe drought prone areas north of 8th parallel • Localized droughts in all Nile countries	Severe

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
B. Refugees and Displaced People	• Pressure on and destruction of surrounding ecosystems, for fuel or agriculture; threat to wildlife habitats and pressure on drink-ing water resources • Spread of disease in camps, especially waterborne, contributing to poor health, malnutrition and death • Migration of large numbers of people to refugee camps and establishment of new, unplanned settlements leading to conflict with exist-ing population	• Sudden, large-scale refugee influxes overwhelming local capacity to provide protect, shelter and food • Inadequate basic subsistence resources such as fuelwood and water; inadequate waste containment and treatment facilities	• Political instability, armed conflicts, governance problems and social unrest • Natural catastrophes such as famine	Localized Main areas of current settlements of refugees and displaced people: • Burundi: Rivubu River region • Ethiopia: Sudan /Ethiopia cross-border area near Dinder (=Alatish valley), Gambella region, Ben-Shangul-Gumuz region, Baro/Akobo area, Dobus swamp area, SW part of country • Rwanda: south of country near Burundi border • Sudan/Uganda border area and Sudan/ Uganda/D.R. Congo area • Sudan: Refugees in eastern Sudan, Kassala and Gedarif States; displaced people along selected areas of Nile • Tanzania: SW lake-shores, Muleba Ngara and Karagwe districts of Kagera region	Moderate overall

C. Uncertain Impacts of Climate Change	• Increase in severe floods and droughts • Potential negative impacts may include: *Ecosystems:* Changes in species distribution and composition; changes in migration patterns; wild-life habitat deterioration *Food securiy, agricul-ture and land use:* Decreasing food security; land deg-radation e.g. through landslides and change in forest and rangeland cover; desertification *Water resources:* Change in local water availability; deteriorating water quality *Health and settlements:* Increase in waterborne diseases; possible increase in urbanization *Economy:* Vulnerability of mostly agrarian based economies in SSA to climate change related impacts	• Climatic changes in temperature, precipi-tation and wet and dry cycles • Changes in weather and rainfall patterns • Impacts and vulnerability due to floods and droughts • Population pressure on limited resources	• Global phenomenon related to anthropogenic activities leading to in-creased emission of green house gases	Basin-wide	Low to moderate

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
)	• Routine accidents (collisions, ground ings, wreckage) and associated pollution risks/ pollution • Navigation risks *Oil discharge:* • Contamination of surface and groundwater, river banks and lakeshores • Adverse impact on natural habitats and biodiversity and species loss	• Poorly separated traf fic and inaccurate navigation charts • Limited navigational devices and aids and lack of technology • Old and poorly con-structed ships and additional overload-ing as well as non-qualified boat owners *Oil discharge:* • Discharge from tankers (cleaning of tanks) and bilge and ballast water as well as increasing inci-dences of oil spills through accidents of tankers (ships)	• Complex navigational hazards (e.g. hidden channels) combined with lack of mapping and insufficient maintenance of waterways (e.g. no regular dredging) • No emergency response system; lack of government control *Oil discharge:* • Lack of technology for preventive and remediation measures; high cost of water treatment; lack of reception and treatment facilities at ports • Industrialization of coasts and river banks	Subregional Critical incidents reported from Lake Victoria and Egyptian river traffic; generally relevant in large lakes, rivers and their ports	Low over all

Navigation Risks, Aids, and Mapping (oil spills, boat discharges D.		• Discharge of petroleum products from industrial sectors and leaking storage tanks	combined with lack of EIA and inadequate control and enforcement of environmental regulations • Lack of oil spill emergency plans and measures		
4. Loss of Biodiversity, Habitat and Wetlands					
A. **Loss and Destruction of Valuable Species, Special Ecosystem, and Habitats**	*Species loss and decline of ecosystems and unique habitats* -• Disappearance of unique animal and plant species, especially endemic ones; decline of species diversity • Decrease in numbers of large mammals with negative impact on tourism and associated decrease in revenue • Decrease in forest cover constituting decrease in food, fuel, timber and shelter *Loss of agrodiversity*-• Loss of genetic base (cattle breeds, crops, vegetables/ fruits); loss of benefits from local variety qualities (tolerance, productivity, resilience); dependency on exotic seeds and breeds/ imported varieties	*Species loss and decline of ecosystems and unique habitats* -• Poaching and illegal trade in valuable species as well as intensive and unsustainable resource use and land management, such as deforestation, wetlands conversion, expansion of agriculture (crops and livestock farming, overfishing, uncontrolled burning and forest fires) • Lack of alternative in-come sources especially in areas of resettlement *Loss of agrodiversity* -• Expansion of hybrid/ high yielding crop and livestock varieties leading to decrease of genetic diversity of domestic species • Introduction of exotic species (not only restricted to agricultural species)	• Population pressure and poverty combined with high reliance on primary natural resources and income from agriculture • Low financial and staff capacity in management of protected areas and associated lack of control and monitoring; poor enforcement of laws protecting gazetted forests and game sanctuaries; lack of financial resources for development and implementation of effective and relevant programs • Weak agricultural extension services • Lack of awareness of biodiversity concerns and benefits from conservation • Lack of regulations to prevent introduction of exotic species • Inadequate and unregulated land use practices; insufficient integrated programs for people living in protected areas	Basin-wide Areas are related to specific issues of species loss*: *Species and ecosystems/ unique habitat loss* • Wetlands • Forest areas • Specific protected areas *Agrodiversity* • Intense primary agricultural areas ** For specific locations please refer to maps attached to this report*	Severe

ISSUE	SYMPTOMS/IMPACTS	IMMEDIATE CAUSES	ROOT CAUSES	EXTENT[1]	SEVERITY
B. Wetland Degradation	• Decrease and degradation of wetland areas (reclamation, siltation, flood damage; water weed infestation) • Decreased benefits from functioning wetlands, e.g. less groundwater recharge, decreased buffering of floods, loss of filter function to absorb and degrade pollutants and associated decrease in water quality; decreasing ability to act as sediment trap; destruction of habitats and loss of biodiversity	• Reclamation of wet-lands to expand agricultural production • Deforestation, erosion and sedimentation • Overuse of natural resources (overfishing/ hunting/ overgrazing, farming practices) • Pollution from industrial, agricultural and domestic sources	• Lack of wetland protection and management regulations and measures and/or lack of implementation • Poverty and population pressure; shortage of land; inadequate land use policies • Lack of awareness of wetlands function and value; cultural habits	Basin-wide œ Important and/or degraded wetlands: • Burundi: Ruvubu, Kanyaru valley and around Lake Rwihinda, Nyamuswaga wetland • D.R. Congo: SW lakeshore of Lake Edward • Egypt: Lake Nasser area, Nile Delta (shores of Lake Mariut, Burullus and Manzala); Qarun and Rayan • Ethiopia: Gambella floodplain (Baro and Akobo River), Lake Tana, Finchaa area, Dobus Swamp/Alatish River • Kenya: Winam Gulf/ Ki-sumu, estuary of Nzoia River, Yara swamp • Rwanda: Upstream of Risumu Falls, lakes south of Kagera National Park (Lakes Rwehikama, Ihema, Hago, and Rwanyakizinga), Lake Cyohoha and entire Lake Bugesera area, Lake Rweru, Lake Mugesera • Sudan: Sudd, Machar Marshes, Dinder wetlands • Tanzania: Simiyu River, Lake Victoria shores, banks of Kagera River/swamps • Uganda: shores of Lake Victoria, Kyoga, Lakes Edward, George and Al-bert	Severe in most countries

Annex 2

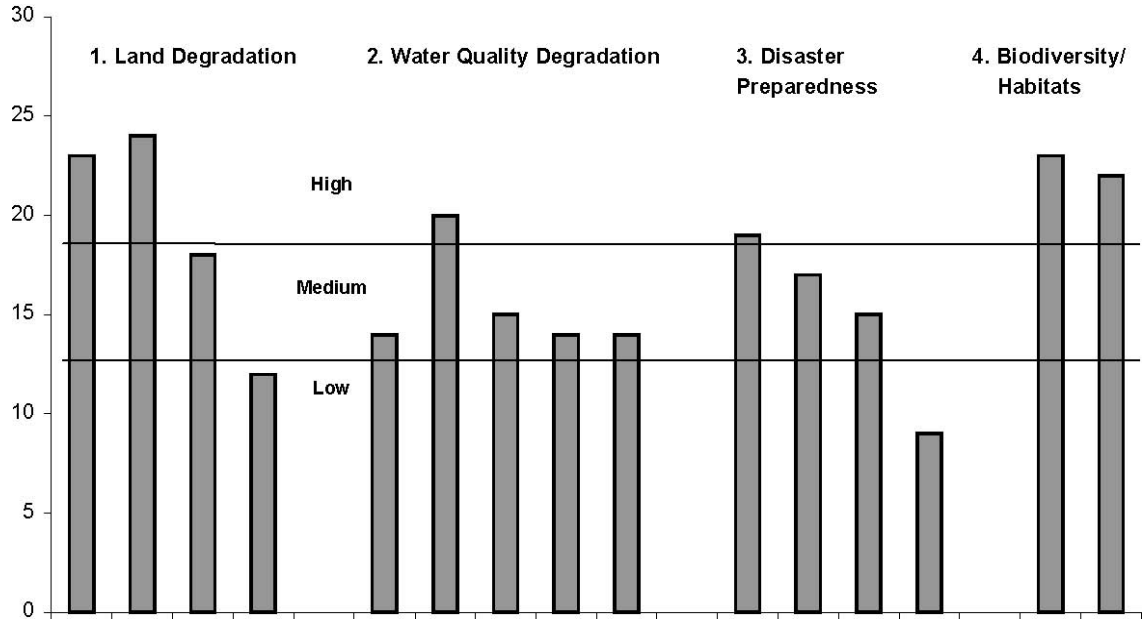
Nile Basin Environmental Threats:

Ranking by Priority and Country

	BU	DRC	EG	ETH	KE	RW	SU	TZ	UG	TOTAL
1. Land Degradation										
A. Deforestation	**	***	*	***	**	***	***	**	***	23
B. Erosion	***	***	**	***	**	***	***	**	***	24
C. Lakeshore/ River bank	**	*	***	***	*	**	*	**	**	18
D. Mining	***	**			*	**	*	**	*	12
2. Water Quality Degradation										
A. Pollution (point and non-point source)			***	*	***	**	*	**	**	14
B. Sanitation	*	**	***	***	**	**	***	**	**	20
C. Eutrophication		**	**	**	***		**	**	**	15
D. Water Weeds	*	*	*		***	**	**	**	**	14
E. Siltation	**			**	**		***	**	***	14
3. Disaster Preparedness										
A. Flood/ Drought	**	**	**	***	**	**	***	**	*	19
B. Refugee	*	***		***	*	***	**	**	**	17
C. Climate Change	**	**	***	***	*	**	*	*		15
D. Navigation Risk		*	**		**		*	**	*	9
4. Loss of Biodiversity, Habitat and Wetlands										
A. Biodiversity	***	***	**	***	**	***	***	**	**	23
B. Wetland Degradation	***	**	***	***	**	***	*	**	***	22

Severity: * = high, ** = moderate, * = low**

NOTE œ To prioritize environmental threats, each national environmental expert had the same number of —stars“ to distribute and assign priority among the list of basin-wide threats, which are described in more detail in Annex 1. The total sum of stars assigned for a particular threat is plotted below to depict basin-wide priorities. High >18 stars; Medium: 13 to 18 stars; Low: < 13 stars



A. DeforestationB. Soil erosion
A. Pollution

C. River bank degradationD. Mining impacts B. Sanitation
E. Siltation

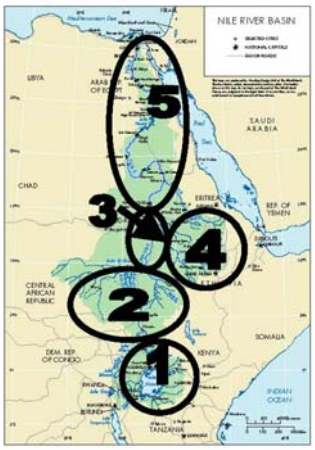
C. EutrophicationD. Water weeds
A. Floods and droughtsB. Refugee issues
A. Biodiversity

C. Climate changeD. Navigation risk
B. Wetland degradation

Annex 3

Transboundary Environmental Analysis: Common Concerns by Sub-Region

COMMON CONCERNS	EQUATORIAL LAKES	LOWER ALTITUDE WATERSHED	WHITE NILE (MALAKAL TO KHARTOUM)	EASTERN HIGHLAND	LOWER NILE (KHARTOUM TO MED.)	BASINWIDE
1. Land Degradation						
A. Deforestation						
B. Soil erosion						
C. River bank and lakeshore degradation						
D. Mining impacts						
2. Water Quality Degradation						
A. Pollution (point and non-point source)						
B. Sanitation concerns (rural and urban sanitation)						
C. Eutrophication						
D. Water weed infestation						
E. Siltation						
3. Disaster Preparedness and Remediation						
A. Floods and droughts						
B. Refugee problems						
C. Uncertain impacts of climate change						
D. Navigation risks, aids, and mapping						
4. Loss of Biodiversity, Habitat and Wetlands						
A. Biodiversity – loss and de-struction of valuable species and habitats						
B. Wetland degradation						



1 Equatorial Lakes 2 Lower Altitude Watershed 3 White Nile (Malakal to Khartoum) 4 Eastern Highlands 5 Lower Nile (Khartoum to Mediterranean)

Key: Sub-regional severity of threats identified in Basinwide Transboundary Analysis

	= high		= moderate		= low

identified in Basinwi is as follows

Annex 4

Environmental Priority Actions by Country

BURUNDI

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Deforestation	• Promote and enhance reforestation of ridges and bare areas; promote agroforestry • Strengthen natural resource management capacities, especially for forest resources • Develop and promote alternative energy sources • Public education program	National	• Environmental management program • Technology improvement • Public education & awareness	Very High
Erosion	• Improve watershed management using integrated approaches; engage public and private sector, crop as well as livestock farmers	National	• Land management program • Capacity building • Awareness raising	Very High
Mining and quarrying	• Require environmental impact assessment prior to any mining and quarrying activity • Monitor ongoing mining and quarrying activities • Undertake environmental rehabilitation after mine closure	National	• Environmental policy and planning	High
Water Resources Management				
Waterborne diseases	• Improve drinking water supply in urban and rural areas	Local, national, regional	• Technology/Infrastructure improvement • Public awareness and education	High
Point and non-point source pollution and waste disposal	• Develop sanitation facilities and infrastructure in urban and rural areas • Improve measures for management and safe disposal of domestic and industrial wastes, including infrastructure for collection and treatment of liquid waste and wastewater	Local, national	• Environmental policy and management • Technology/infrastructure improvement • Capacity building • Public awareness	Moderate
Water weed infestation	• Continue to implement measures to fight water hyacinth	Provincial, regional	• Technology improvement • Environmental planning and management • Transboundary cooperation	Moderate
Biodiversity, Habitat and Wetlands				
Wetland degradation	• Undertake priority implementation of existing —Master Plan for Wetland Management;" enhance coordination of all activities undertaken in wetland areas • Improve coordination and information flow between farmers and private and public technical services	Local (wetland areas)	• Environmental planning • Improved information • Community consultation and participation	High
Loss and destruction of valuable species, ecosystems and special habitats	• Emphasize public education • Strictly enforce laws, regulations and conventions • Harmonize management policies of transboundary ecosystems with neighboring countries; involve police and customs, park and natural preserve services	National and regional	• Awareness and public education program • Environmental policy and enforcement • Environmental monitoring	High
Policy and Capacity Strengthening				
Institutional capacity building	• Increase human, financial and physical resources of Ministry in charge of Environment and its technical institutes to allow effective implementation of mandate • Create entity in charge of coordination between all public and private services using a common resource • Develop environmental policies and mechanisms for their enforcement	National	• Capacity building • Environmental policy and planning • Environmental regulation and policy enforcement • Coordination and information exchange	Very High
Legal capacity building (Ministry in charge of Environment and its technical institutes (INECN and IGEBU)	• Develop and/or enhance national legal instruments pertaining to environmental protection; implement existing regulations • Implement international conventions (through integration in to national policies) • Involve NGOs in elaboration and implementation of environmental policies	National, regional	• Environmental policy and planning • Environmental regulation and policy enforcement • Public participation and consultation, NGO involvement	Moderate

D.R. CONGO

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Deforestation	• Rehabilitate degraded areas in Virunga National Park, forest reserves and stripped areas through re-forestation, agroforestry and silviculture • Promote use of novel and renewable energy sources • Strengthen natural resource management capacities • Undertake environmental education of population • Develop alternatives to slash and burn agriculture; decrease overgrazing	Provincial, regional	• Environmental policy and planning • Strengthening resource management and use of alternative energies • Public participation and consultation, role of NGOs • Public education and awareness	Very high
Erosion	• Identify and assess eroded and at risk areas • Implement land restoration and conservation measures • Undertake sustainable management if watersheds; involve government technical services, NGOs, and broader population	Provincial, regional	• Environmental planning and mitigation measures • Public participation and consultation, role of NGOs	Very high
Impact of mining and quarrying	• Develop procedures for environmental impact analysis prior to any site development • Rehabilitate areas degraded by mining activities	Provincial	• Environmental policies and enforcement • Capacity building • Land use planning	Very high
Agricultural land degradation	• Promote agro-silvo-pastoralism • Enhance technical extension service to promote improved agricultural techniques • Implement land restoration and conservation measures • Promote Integrated management of watersheds	Provincial, regional	• Land use and environmental planning • Capacity building • Public participation and involvement of NGOs	High
Water Resources Management				
Water weed infestation	• Implement measures to fight against water hyacinth	Provincial, regional	• Technology improvement • Environmental planning and management • Transboundary cooperation (Uganda)	Very high
Disaster Preparedness				
Drought	• Implement programs to prevent increasing deforestation; alternatives to slash and burn; measures to prevent overgrazing • Strengthen capacities of technical services in respect to implementation of ratified conventions	Provincial	• Land use/ environmental planning • Capacity building	High
Biodiversity, Habitat and Wetlands				
Loss and destruction of valuable species and special ecosystems and habitats	• Strengthen capacities for environmental awareness raising and public education • Implement existing laws and regulations as priority measures • Harmonize common ecosystem management policies with those of neighboring countries	National, provincial, regional	• Capacity building • Public participation and consultation, role of NGOs • Public education and awareness • Transboundary, regional cooperation	Very high
Policy and Capacity Strengthening				
Development of environmental policies	• Finalize ongoing policy development work in forestry, fisheries, water resources and environment • Update National Land use Plan and expand regional plans	National	• Environmental policy and planning	Very high
Institutional capacity building	• Provide the Ministry and its specialized services with increased financial, physical and human resources • Revitalize activities of the inter-ministerial commit-tee for environmental management issues	National, provincial	• Environmental policy and planning • Institutional capacity building	Very high

EGYPT

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Soil Erosion/Siltation	• *River banks, river islands and lakeshore degradation:* Develop and implement mitigation measures for conservation of the environment, including solid waste management program; increase public awareness; enforce existing environmental regulations • *Delta/Coastal degradation:* Develop shore protection program and master plan; implement shore protection measures	Local national, regional	• Environmental and water resources management • Enforcement of environmental regulations • Information dissemination • Public education and awareness	Moderate to high
Desertification	• Develop integrated soil and water management program, national programs to combat desertification, and national land use plan • *Reclamation of desert fringes:* Develop vulnerability maps, management plans	Local national, regional	• Capacity building • Environmental management and land use planning • Regional cooperation • Awareness programs	Moderate to high
Agriculture land degradation	• Develop innovative solutions through research • Rangeland degradation: Increase priority for sustainable development programs, such as programs to decrease overgrazing; educational programs	Local national, regional	• Capacity building • Educational programs • Management programs	Moderate to high
Water Resources Management				
Wetland degradation	• Develop effective and efficient, environmentally sustainable master plan for water and land resources • Promote integrated wetland management, capacity building, and land use planning	Local national, regional	• Capacity building • Environmental management • Development/ enforcement of environmental regulations	High
Agricultural pollution	• Reduce use of agro-chemicals and pesticides, modify laws and promote enforcement • Reuse of drainage water: Develop policy, standards and guidelines for reuse of drainage water, enforce existing regulations	Local national, regional	• Capacity building • Technical development • Awareness program • Environmental policy, regulations and enforcement	High
Discharge of domestic wastewater and resulting waterborne diseases	• Develop a coordinated action plan for most critical locations • Develop public awareness program • Improve sanitation facilities • Promote conservation and safe reuse of treated wastewater	Local national, regional	• Public awareness • Infrastructure and technology improvement • Capacity building	High
Discharge of industrial wastewater	• Introduce wastewater management plan • Enforce environmental laws • Introduce incentives for pollution prevention, e.g. through tax policy	Local national, regional	• Capacity building • Technology improvement • Public awareness • Coordination between enforcement entities	High
Disposal of solid wastes	• Improve management of solid wastes • Develop recycling plans • Increase public awareness	Local national, regional	• Capacity building • Environmental management • Public education and awareness	Moderate to high
Water weeds	• Develop and implement weed control plans	National, regional	• Technology improvement • Capacity building	Moderate
Unsustainable exploitation of groundwater	• Develop groundwater potential plans • Improve groundwater management	Local national, regional	• Capacity building • Improved information • Management program	Moderate

Environmental monitoring	• Strengthen environmental laboratory and monitoring capacity, including standardization of sample collection, testing and reporting procedures on a regional basis	National, regional	• Capacity building • Improved knowledge and information • Regional cooperation	Moderate
Disaster Preparedness				
Transport and navigational risks	• Undertake feasibility study for using Nile River system for local/transboundary transport of goods • Define safe navigational channels as well as hazardous stretches; identify essential navigational aids • Prepare regulations and enforcement mechanisms; formulate guidelines for vessel design, siting and regulation of ports and required waste reception facilities • Prepare contingency plans	National, regional	• Awareness creation • Management plan • National environmental policies and regulations • Capacity building	High

ENVIRONMENTAL ISSUE	**PRIORITY ACTION**	**SPATIAL SCALE**	**TYPE OF ACTION**	**URGENCY**
Natural causes (flood/droughts)	• Prepare criteria for land use plans • Improve collection of climatic change data to improve forecast abilities • Prepare disaster contingency plans • Allocate available financial resources to poor countries in the region	Regional	• Improved knowledge and information dis-semination • Financing mechanisms • Regional emergency plans in respect to displaced people • Regional cooperation	High
Climatic changes	• Devise measures for reduction of green house gas emissions • Improve collection of climate change/variability data to improve forecast abilities • Prepare regional guideline • Determine provision of regional financial resources	Regional	• Improved knowledge and information • Regional environmental policy and financing mechanisms • Cooperation • Public education and awareness	High
Biodiversity, Habitat and Wetlands				
Water quality degradation, wetlands protection	• Wetlands protection: develop a regional program for conservation of bird habitats and threatened species	National, regional	• Environmental management program • Capacity building • Public participation and consultation, involvement of NGOs	High
Degradation of protected areas	• Develop institutional capacity and framework for a national and regional network for protected areas	National, regional	• Environmental management program • Capacity building • Information network and regional cooperation	High
Introduction of new species	• Develop adequate management system, assessment of existing conditions	National, regional	• Improved knowledge and information • Capacity building • Environmental policies	Moderate
Policy and Capacity Strengthening				
Institutional and legal capacity building	• Introduce an integrated, coordinated action plan to develop mechanisms for national law development and enforcement	Local national, regional	• Environmental policy, regulations and enforcement • Institutional reform • Capacity building	High
Environmental lysustainable development in the basin, transboundary/crosscutting issues	• Obtain high-level commitment by governments to achieve conservation and sustainable use and development of the Nile basin • Develop and implement environmentally sustainable development plans in the region • Identify potential cooperative projects • Collaborate to develop common environmental goals and guidelines in the future	Local national, regional	• Cooperation • Public awareness • Environmental polices and management • Enforcement of environmental regulations • Improved information • NGO involvement	Moderate to High

	• Increase public awareness of river basin approach			
Over-exploitation of resources and public awareness	• Develop management plans • Develop national environmental regulations and enforcement mechanism to prevent man-made damage • Increase public awareness of scarcity of water and environmental quality	National, regional	• Environmental management • Public awareness and education • Improved information • NGO involvement and public participation	Moderate to high
Degradation of cultural heritage	• Promote public awareness to increase recognition of importance of cultural heritage • Develop/implement adequate safeguard measures	National, regional	• Public awareness • Development and enforcement of environmental regulations • Capacity building	Moderate

ETHIOPIA KENYA

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Soil degradation and erosion	• *Soil degradation:* Support and expand community efforts in physical soil and water conservation measures and agroforestry farming; establish community fund for conservation • *Soil erosion:* Develop hillside reforestation; measures for enhancing soil fertility; agroforestry; incentives for resettlement of people from marginal sites • *Soil fertility loss:* Expand organic farming methods	Basin-wide, mostly in blue Nile and Tekeze- sub basins	• Technology improvement • Environmental management, land use plans • Public education and awareness • Livelihood improvement	Very High
River bank and lakeshore degradation	• Enhance soil moisture/irrigation in upland for dry season production; rainwater harvesting; small scale dams and irrigation • Enforce national laws and regulations	Mostly in blue Nile and Tekeze sub-basins	• Technology improvement • Environmental management • Awareness creation	Very High
Loss of forest and other vegetation	• Reduce biomass use through provision of alternative energy sources and construction materials (household fuelwood plantations, cooking stoves, photovoltaics); expand hydro-power • Promote afforestation programs; range land development • Undertake watershed management; regulations	Basin-wide	• Developing new, alternative energy sources • Alternative livelihood • Public education & awareness • Environmental policy	High to very high
Desertification	• Improve soil moisture retention capacity; improve land (vegetation) cover; irrigation development • Improve pastoral grazing lands • Maximize drought resistant crops and vegetation	Provincial (Emphasis in low lands)	• Technology improvement • Environmental management • Awareness creation	High
Water Resources Management				
Water supply and sanitation	• Develop/improve water supply infrastructure and provide sufficient safe water in towns • Construct sanitation infrastructure and appropriate technologies (sewer lines, low cost sanitation, solid waste disposal)	Basin-wide	• Technology /infrastructure improvement • Environmental management • Improved livelihoods • Public education & awareness	Very High
Disaster Preparedness				
Mitigation of effects of drought	• Strengthen early warning system and disaster preparedness • Improve pastoral lands; maximize perennial vegetation and production in productive areas, irrigation development and water harvesting, afforestation	Basin-wide	• Improved information and disaster preparedness • Environmental/land use management • Alternative livelihoods • Cooperation	Very High

Settlement and migration	• Settle refugees in appropriate areas; improve planning in settlement conditions; invest in irrigation infrastructures and sustainable water supply in lowlands; eradi-cate tropical diseases in lowlands	Lowlands in the basin	• Alternative livelihoods • Capacity building • Environmental management • Settlement plans • Public awareness	Moderate
Biodiversity, Habitat and Wetlands				
Degradation of protected areas	• Enforce regulations for protected areas and increase capacity for parks management • Intensify crop production on existing cropland and im-prove existing grazing lands to decrease encroachment in protected areas • Reduce human influx to protected areas	Basin-wide	• Capacity building • Awareness creation • Alternative livelihood • Settlement plans	High
Wetlands degradation and loss of aquatic life biodiversity	• Promote alternative livelihoods; small scale irrigation development • Establish wetland development and conservation poli-cies • Formulate laws for aquatic resource management	Basin-wide	• Alternative livelihoods • Improved technology • Environmental policy • Awareness creation •	Moderate
Loss of agricultural crop Biodiversity	• Support farmers and communities to promote inœsitu conservation; undertake pilot projects for in situ conser-vation of endangered species • Support ex-situ conservation efforts • Develop regulations and enforce them	Basin-wide	• Environmental policy • Improved technology • Conservation measures • Public awareness	Moderate
Genetic erosion	• Awareness creation	Basin wide	• Awareness creation	Moderate
Policy and Capacity Strengthening				
Crosscutting issues	• Develop information systems in implementing agencies; promote networking and communication between sec- toral agencies, local regional governments and between riparian countries; increase capacity of federal and re gional government offices • Strengthen awareness creation efforts	Basin-wide	• Improved knowledge and information • Capacity building • Public awareness and education	High

ENVIRONMENTAL ISSUE	**PRIORITY ACTION**	**SPATIAL SCALE**	**TYPE OF ACTION**	**URGENCY**
Land Degradation				
Land use	• Implement soil and water conservation measures including agroforestry, afforestation, optimal use of agricultural inputs • Reduce agrochemical use, waste disposal	Local, national	• Land use/environmental management • Environmental policy • Technology improvement • Capacity building	Very High
Water Resources Management				
Water pollution and waste management	• Review and update pollution control legisla-tion • Strengthen enforcement capacity; rehabilitate water pollution monitoring stations • Rehabilitate urban and rural sanitation and soil conservation measures • Reduce generation, properly manage and dispose of solid wastes (municipal, hospital and industrial)	Local, national	• Environmental policy • Capacity building • Technology improvement	Very High
Water weeds	• Implement biological/mechanical control of water hyacinths and other aquatic weeds • Control nutrient and sediment flow into water bodies	Regional, national	• Environmental management • Capacity building • Public participation and consultation, community involvement	High
Infrastructure	• Develop roads, port facilities, fish landing areas, refuse disposal facilities	Local, national	• Technical /infrastructure improvement • Environmental manage ment	High

Water use	• Plan and develop multi-purpose dams for hydropower, irrigation, fisheries and flood control	Local, national	• Technical /infrastructure improvement	High
Water and sanitation	• Increase urban supply of treated/ piped water and increase sewer coverage • Develop rural water supply and sanitation	Local, national	• Environmental management • Technology improvement	Moderate
Disaster Preparedness				
Navigation	• Rehabilitate navigation aids, radio communication and update navigation charts/maps • Plan and develop contingency measures for oil spill in Lake Victoria	National, regional	• Technology improvement, reduction of navigation risk • Capacity building	High
Unplanned settlement	• Enforce zoning plans • Create employment throughout basin to slow down migration • Manage population	Local national, regional	• Environmental policy and management • Public consultation and participation	High
Floods	• Plan and develop flood control and other related contingency measures in the basin	National	• Capacity building • Technology improvement	Moderate
Biodiversity, Habitat and Wetlands				
Wetlands conservation	• Identify and inventory important wetlands in the basin • Undertake conservation and wise use of wetland resources	Local, national	• Environmental planning • Wetland management	Very High
Policy and Capacity Strengthening				
Environmental awareness	• Enhance environmental awareness programs by public and private sectors	Local, national, regional	• Public awareness and environmental education	Very High
Institutional capacity building	• Assess and strengthen institutional capacity for environmental management	Local, national regional, international	• Capacity building • Technical development	Very High
Environmental information and networking	• Improve accessibility to environmental information through creation of databases, media involvement and networking of relevant institutions	Local, national, regional, international	• Public awareness • Capacity building • Improved knowledge and information	High

RWANDA SUDAN

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Deforestation	• Rehabilitate and restore forest areas (Umutara, Nyungwe, Gishwati and Mukura) • Promote new and renewable energy sources; promote appropriate technologies aimed at reducing use of firewood •	National, regional	• Environmental management • Technology improvement/alternative energy sources • Capacity building • Public participation and education	Very High
Erosion control	• Implement watershed and wetland management program • Rehabilitate anti-erosion measures; hillside reforestation • River bank and lakeshore degradation: Protect and rehabilitate river banks and lakeshores	National	• Environmental/land use policy and planning • Technology improvement	Very High
Impact of mining and quarrying activities	• Improve work conditions and investment in mining operations • Rehabilitate old mines • Process mine tailings • Undertake environmental impact studies	Local, national, regional	• Environmental policy and planning • Capacity building • Enforcement of environmental regulations	Moderate

Water Resources Management				
Pollution of water resources and waterborne diseases	• Improve drinking water supply in urban and rural areas • Develop sanitation in urban and rural areas • Promote environmental health and sanitation measures, and popular health education	National	• Technology/ infrastructure improvement • Public awareness and education	High
Water weed infestation	• Undertake program to combat water hyacinth • Protect watershed to limit expansion of water hyacinth	National, regional	• Technology improvement • Environmental planning • Public awareness	High
Urban and industrial issues	• Develop and implement urban master plans; elaborate and implemente master plans in urban health and sanitation • Improve management of household and solid waste, including infrastructure for collection and treatment of liquid waste and wastewater	National, regional	• Environmental policy and management • Technology/infrastructure improvement • Capacity building • Public awareness	High
Disaster Preparedness				
Floods and droughts	• Implement early warning system to mitigate impacts of catastrophic events; strengthen meteorological services • Increase food stocks to prevent/alleviate famine situations	National	• Resources policy and planning • Technology improvement • Disaster preparedness	Very High
Refugee issues	• Improve programs for resettlement of displaced people and improve servicing of resettlement sites • Rehabilitate deforested areas	National	• Resource management • Support program for resettlement areas	High
Biodiversity, Habitat and Wetlands				
Wetland degradation	• Develop and implement wetland master plan; integrate environmental considerations in wetland management and development	National	• Wetlands management	High
Loss and destruction of valuable species and special ecosystems and habitats	• Improve park management and physical delineation of protected areas • Implement integrated rural development projects in zones surrounding protected areas • Promote participation and consultation of local population in conservation efforts	Regional	• Environmental policy and planning • Public participation and consultation	High
Policy and Capacity Strengthening				
Capacity-building	• Improve technical capacity in environmental management and sustainable development • Improve financial capacity to implement economically viable, ecologically sound and socially acceptable development	National	• Capacity building • Finance mechanism and support	High
National environmental regulations	• Implement existing laws & regulations • Update national environmental strategy and action plan	National	• Environmental policy • Enforcement of environmental regulations • Capacity building	High

Environmental Issue	**Priority Action**	**Spatial Scale**	**Type of Action**	**Urgency**
Land Degradation				
Deforestation	• Promote agroforestry and integrated land use planning	National, regional	• Technical improvement • Management information • Capacity building	High
Soil erosion and siltation	• Develop watershed management plans; monitor environmental conditions • Implement anti- erosion measures	National	• Technical improvement • Management information • Capacity Building	High
River bank erosion	• Undertake flow regulation • Develop land use plan • Undertake sediment transport studies and research	National, regional	• Technical development and research • Environmental planning • Capacity building	High

Mining impact	• Develop management plan for operational and planned mining operations • Implement legislation	Local	• Technical development • Awareness program • Capacity building • Enforcement of environmental regulations	Moderate
Water Resources Management				
Wastewater discharge and waterborne diseases	• Increase number of sewage treatment plants and operation of existing ones • Implement adequate pollution control regulations and monitoring • Provide health care and immunization • Establish disaster control measures	National	• Technical development • Capacity building • Improved health care	High
Water weeds infestation	• Use biological control measures • Develop end-uses of plant residue e.g. for energy production	National, regional	• Technical improvement • Capacity building • Feasibility studies • Management plan	High
Siltation	• Implement watershed management plans, erosion control measures • Create sustainable development strategies	National	• Technical development • Capacity building	High
Control of pesticide use	• Regulate pesticide use; promote use of organic fertilizers • Implement awareness programs	National, regional	• Technical improvement • Environmental policy • Capacity building • Awareness program	High
Urban and industrial development	• Upgrade solid waste management • Develop and implement strategies and zoning laws • Develop EIA guidelines/ feasibility studies	National	• Technical improvement • Environmental policy and regulations • Capacity building	High
Disaster Preparedness				
Floods and droughts	• Develop disaster management plan • Strengthen early warning system; develop relevant data base	National	• Technical improvement • Information improvement • Capacity building	High
Refugee issues	• Encourage political stability • Develop contingency plans • Undertake precautionary measures to prevent resource degradation; rehabilitate affected areas • Provide support to areas to prevent adverse effects	National	• Sustainable development • Capacity building • Emergency plans and support	High
Uncertain impacts of climate change	• Decrease emission of greenhouse gases; decrease impact from adverse human activities • Prevent forest fires	National	• Technology improvement • Environmental policy • Capacity building	High
Biodiversity, Habitat and Wetlands				
Biodiversity	• Develop biodiversity conservation strategy and action plans • Develop management plans	National	• Environmental planning • Improved information • Capacity building	High
Wetland degradation	• Decrease blackwater run-off • Develop management plan • Collect and analyze data, exchange information	National	• Technical development • Capacity building • Improved information	High
Policy and Capacity Strengthening				
Community development	• Develop and implementation poverty alleviation program	National	• Feasibility studies • Capacity building • Technical Development	High

TANZANIA UGANDA

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Land degradation	• Establish natural resources conservation and reforestation program; integrated land use planning • Implement capacity building and public education and awareness program at regional, district and village level • Develop measures to address overgrazing and livestock rearing	National, regional	• Land management • Public education and awareness program • Capacity building	Very High
Deforestation	• Develop agroforestry and integrated land use planning program • Increase alternative sources of energy; develop hydropower; household wood plantation	National	• Land management • Technology improvement • Capacity building • Public awareness • Capacity building	Very High
Soil erosion and siltation	• Develop land use and watershed management plans • Undertake sediment transport studies • River bank and lakeshore degradation: implement land use policy and action plan; enforce legislation	National, regional	• Land use planning • Capacity building • Enforcement of environmental regulations • Technology improvement	Very High
Desertification	• Implement National Action Program to Combat Desertification; develop soil and water conservation programs, afforestation and reforestation programs	National	• Land use planning • Capacity building • Public awareness	High
Mining impact	• Develop land management plan • Implement existing legislation, including EIAs on all mining projects • Monitor water quality to regulate pollution from mining at cross-border sites	National, regional	• Awareness creation • Capacity building (EIA) • Enforcement of environmental regulations	High
Water Resources Management				
Pesticide use	• Create awareness among the general public • Promote improved land use practices; devise and implement regulations for pesticide use and discharge; monitor pesticide levels in water bodies	National, regional	• Public awareness • Environmental planning • Environmental policy and regulations	High
Domestic wastewater discharge in lakes and rivers	• Ensure compliance with existing regulations • Maintain wastewater treatment plants and rehabilitate sanitation infrastructure • Create awareness among public	National, regional	• Enforcement of environmental regulations • Technical improvement • Capacity building	High
Urban development	• Update urban master plans and regulations • Industrial infrastructure: develop EIA guidelines; strategies for siting and zoning, including feasibility studies • Improve solid waste management	National	• Technical development • Technical assessment • Capacity building	High
Disaster Preparedness				
Refugee issues	• Rehabilitate affected areas (deforested areas, water supply schemes; improve roads) • Establish precautionary measures and contingency plans	National, regional	• Environmental management • Capacity building	High
Uncertain impacts of climatic changes	• Regulate greenhouse gas emissions from anthropogenic sources; regulate livestock keeping practices • Improve capacity to control bush fires	National	• Environmental policy • Capacity building • Awareness creation	High
Navigational risks (Lake Victoria)	• Reduce need for navigational aids through hydrographic surveys and updated charts; develop rescue and oil spills contingency plan	National, regional	• Capacity building • Reduction of navigation risks	Moderate
Flood and drought	• Develop drought management action plan • Strengthen early warning system; establish relevant database and information exchange mechanism	National, regional	• Management program • Capacity building • Awareness program • Improved information	Moderate
Biodiversity, Wetlands and Habitat				
Wetland degradation	• Prepare national wetland policy, guidelines and action plan	National	• Capacity building • Environmental planning • Improved information	Moderate
Policy and Capacity Strengthening				

Community development	• Develop and implement poverty alleviation program	National	• Poverty alleviation program • Technical development • Capacity building	High
Harmonization of legislation	• Develop a plan to reduce pollution of Lake Victoria by taking steps to harmonize laws and regulations in bordering countries	National, regional	• Capacity building • Regional environmental policy	Moderate
Degradation of protected areas	• Develop program to reduce unplanned migration into basin • Take steps to harmonize regulations on protecting cross-border game and forest protected areas • Rehabilitate degraded areas; minimize shifting cultivation e.g. through improving agricultural techniques; im-prove existing grazing lands incl. water supply	National, regional	• Awareness creation • Capacity building • Management program • Environmental policy	Moderate

ENVIRONMENTAL ISSUE	PRIORITY ACTION	SPATIAL SCALE	TYPE OF ACTION	URGENCY
Land Degradation				
Land degradation	• Protect forest resources outside reserves and control deforestation; enhance community tree planting programs; improve watershed management • Create awareness to promote sound land use and soil conservation practices • Intensify law enforcement to prevent further encroachment into forests and forest preserves • Develop and promote alternative energy sources to substitute fuelwood; increase efficiency of current fuelwood usage • Diversiify income to reduce pressure on forest resources	Local, national	• Land use management • Community consultation and participation • Environmental policy • Enforcement of environmental regulations • Alternative livelihoods	Very High
Water Resources Management				
Industrial water pollution	• Inventory and control pollution hot spots • Control untreated industrial discharges; enforce effluent discharge regulations • Take steps to harmonize environmental regulations regarding waste discharge in riparian countries • Adopt cleaner production technologies • Establish EIA for all planned projects with impact on water resources, including design of pollution prevention and pre-treatment measures	Local, national, basin-wide (urban centers)	• Enforcement of environmental regulations • Regional environmental policy • Information improvement • Technology improvement, pollution prevention	Very High
Siltation of water bodies	• Implement sound land use and agricultural practices • Create awareness among riparian communities • Strengthen community based water resources management	National, local	• Community awareness and capacity building • Improved information.	High
Capacity for water resources assessments	• Increase capacity in government institutions (including establishment of surface / groundwater balance, water resources assessments); improve hydro-meteorological monitoring network • Increase analytical capacity for water quality monitoring	National	• Capacity building • Technology and information improvement	High
Urban sanitation and waste disposal	• Control raw sewage discharge; improve sanitation infrastructure • Increase awareness of appropriate sewage handling and impacts on receiving waters • Strengthen community based water resources management efforts	Local	• Management program • Capacity building • Awareness program • Technology improvement • Environmental governance	Moderate
Disaster Preparedness				
Refugee issues	• Undertake studies on suitability of resettlement areas and availability of energy sources	Local	• Environmental planning • Policy measures	High
Navigation risk	• Undertake technical development • Implement emergency measures for ship accidents, including oil spills	National, local	• Reduction of navigation risks • Technology improvement	Moderate

Biodiversity, Habitat and Wetlands				
Encroachment into protected and marginal wetlands and near shore areas	• Enforce laws and regulations to protect wetland and shoreline ecosystems • Inventory and designate protection zones • Develop national land use policy; community based management programs • Continue programs to combat aquatic weeds, especially water hyacinth	National, local	• Environmental policy • Enforcement of environmental regulations • Community participation	Very High
Biodiversity loss	• Protect sensitive ecosystems such as forests and wetlands; prevent further encroachment into protected areas • Develop policies to protect biodiversity outside protected areas • Enforce laws in reserved areas	National, local	• Environmental policy • Enforcement of environmental regulations • Community participation	Moderate
Policy and Capacity Strengthening				
Environmental governance	• Increase awareness of existing policies and regulations regarding environmental governance issues on district and community level • Increase involvement of NGOs and community based approaches • Consider basin-wide strategies for sustainable resource management	Local National, Regional	• Environmental policy and planning • Capacity building • Community and public participation program	Very High
Limited environmental awareness	• Create awareness of land water interaction and sustainable management options	National	• Public education and awareness program	Moderate

Annex 5

Stakeholders Consulted During National Process

COUNTRY **STAKEHOLDER**

BURUNDI Agri-Consult Département de l'Environnement Deuxième Vice-Présidence de la République Food & Agriculture Organisation (FAO) Générale de l'Aménagement du Territoire et de l'Aménagement - Génie Rural (Gestion des Marais) Institut Géographique du Burundi (IGEBU) œ Cartographie Institut Géographique du Burundi (IGEBU) œ Climatologie Institut Géographique du Burundi (IGEBU) Institut National Pour l'Environnement et la Conservation de la Nature (INECN) - Département Technique Institut National Pour l'Environnement et la Conservation de la Nature (INECN) Ministère de Développement Rural et de L'Artisanat Ministère de l'Agriculture et de l'Elevage Ministère de l'Agriculture et de l'Elevage - Département des Pêches et Pisciculture Ministère de l'Aménagement du Territoire et de l'Environnement Ministère de l'Energie et des Mines - Géologie et Mines Ministère de la Santé Publique - Propreté Environnement Santé (PES) Programme des Nations unies pour le Développement (PNUD) Universitè du Burundi

D.R. CONGO Agence Nationale de Metéorologie et de Telédétection par Satellite (METTELSAT) Bureau d'Etudes de l'Association pour le Développement de Beni et Lubero (ADEBEL) Bureau Dendrologie Cellule Juridique au Secrétariat Général de l'Environnement œ Conservation de la Nature, Pêche et Forêts (SG œ ECNPF) Centre National d'Information Environnementale (CNIE) Comité Interministériel de Coordination en matière d'environnement Comité National d'Action de l"Eau et de l'Assainissement (CNAEA)

	Comité National MAB (Man and Biosphere) Direction d'Etudes et Planification Direction de Pêche et Ressources en Eau (DPRE) Direction des Etablissements Humains et Protection Environnementale Institut Géographique de Congo Institut Supérieur des Techniques Appliqués (ISTA) Ministère de l'Agricultre, Elevage et Développement Rural Ministère de l'Intérieur et des Affairs Coutumières Ministère du Plan et Consultant national chargé du volet utilisation efficace de l'eau pour l'agriculture National du Projet œ FAO Notabilité de la Province du Nord œ Kivu Organisations autogérées et Organisations non-gouvernementales (ONGS) Point Focal œ Lutte contre la Désertification Programme Hydrologique International (PHI)

COUNTRY	STAKEHOLDER
	Régie de Distribution d'eau (REGIDESO) Régie des Voies Fluviales (RVF) Services Généraux Service National pour la Promotion et le Développement de la Pêche (SENADEP) Société Nationale d'Electricité (SNEL) Système d'information Géographique (SIG)
EGYPT	Ain Shams University - Engineering Department Ain Shams University œ Environmental Institute Arabian Youth and Environment Office Cairo University œ Engineering Department Climate Change and Environmental Research Institute Drainage Research Institute Egypt Youth for Development and Environment Egyptian Environment Federation Egyptian Environmental Affairs Agency - Central Department for Information and Environmental Awareness Egyptian Environmental Affairs Agency - Environment Quality Department Egyptian Environmental Affairs Agency - Natural Protectorate Department Groundwater Research Institute Ministry of Agriculture Ministry of State for Environmental Affairs Ministry of Water Resources and Irrigation Ministry of Water Resources and Irrigation - National Water Quality and Availability Project National Water Research Center Water Resources Master Plan Project
ETHIOPIA	Agri-Service Ethiopia (ASE) Bureau of Agriculture Bureau of Economic Development and Planning Bureau of Water Resources and Energy CARE œ Ethiopia Christian Relief and Development Agency (CRDA) CISP Conservation Strategy for Ethiopia Ethiopia Environmental NGO (EENGO) Environmental Protection Authority Ethiopian Aid Ethiopian Aid Ethiopian Wildlife and Natural History Society (EWNHS) Ethiopian Wildlife Conservation Organization HNDEE (Oromo Grass-roots Development Initiative) Institute for Biodiversity Conservation and Research (IBCR) Japan International Volunteer Center (JIVC) Ministry of Agriculture Ministry of Mines and Energy Ministry of Planning and Economic Development Ministry of Transportation and Communication Ministry of Water Resources Natural Resources Management in Amhara National Regional Government OXFAM-Great Britain Regional Conservation Coordinating Committee Soil Conservation Program-Sweden United Nations Industrial Development Organization (UNIDO)

COUNTRY	STAKEHOLDER
KENYA	Africa Water Network Care Kenya Department of Civil Engineering œ University of Nairobi East African Cross-Border Biodiversity Project Forest Department International Centre for Insect Physiology and Ecology (ICIPE) œ Mbita Point Station International Network for Water and Sanitation (NETWAS) Irrigation and Drainage Branch œ Ministry of Agriculture and Rural Development IUCN œ East African Regional Office Kenya Association of Manufacturers Kenya Marine Fisheries Research Institute (KMFRI) œ

	Kisumu Kenya Water Institute Kenya Wildlife Society (KWS) Kipsaina Youth Conservation Group Kisumu Municipal Council Lake Basin Development Authority Lake Victoria Environment Management Project Maseno University College MENR - Uasin Gishu District Ministry of Environment and Natural Resources Ministry of Environment and Natural Resources (MENR) - Suba District Ministry of Finance and Planning Ministry of Local Authorities Moi University National Environment Secretariat National Irrigation Board National Museums of Kenya Osienala Kisumu Pan-African Paper Mills Water and Sanitation Department (WSD) - Kisumu Municipal Council Water Development Department Wetlands Program World Wild Fund for Nature (WWF)
RWANDA	Association pour la Recherche en Aménagement du Territoire (ARAMET) CESTRAR Division Aéronautique au Ministère des Travaux Publics, du Transport et des Communications (MINITRACO) ELECTROGAZ Institut de Recherche Scientifique (l'IRST) Institut des Science Agronomiques de Rwanda (l'ISAR) Ministère de l'Agriculture, de l'Elevage et des Forêts (MINAGRI) Ministère de l'Eau et des Ressources Naturelles (MINERENA) Ministère de l'Energie Ministère de la Justice (MINIJUST) Ministère des Terres, de la Réinstallation et de la Protection de l'Environnement (MINITERE) Ministère du Commerce, de l'Industrie et du Tourisme (MINICOM) National Office for Population (ONAPO) Office Rwandais du Tourisme et des Parcs Nationaux (ORTPN) United Nations Development Programme (UNDP) United Nations Children's Fund (UNICEF)

COUNTRY	**STAKEHOLDER**
SUDAN	Animal Resources Research Corporation Arab Organization for Agricultural Development Environmentalist Society Farmers Union Fisheries Research Center Food & Agriculture Organisation (FAO) Geologist Trade Union Higher Council of Civil Defense Higher Council of Environment and Natural Resources Hydraulic Research Station Institute of Disaster Management Institute of Environment and Natural Resource Research Institute of Environmental Studies Juba University œ College of Environment and Natural Resource Studies Ministry of Agriculture and Forestry Ministry of Animal Resources Ministry of Economic Planning Ministry of International Cooperation and Investment Ministry of Irrigation and Water Resources Ministry of Justice National Forest Corporation Save the Children œ Great Britain Sudanese Environmental Conservation Society Union of Engineers UNESCO National Committee University of Khartoum œ College of Agriculture Wildlife Department Wildlife Research Center World Health Organization (WHO)
TANZANIA	Environment Division of the Vice President's Office Green Shinyanga Group Health through Sanitation and Water Project - Mwanza Journalist Environmental Association (JET) Lake Victoria Environment Management Project Mwanza Town Council Directors Office Ministry of Agriculture and Co-operatives œ Crop and Irrigation Division Ministry of Communication and Transport Ministry of Energy and Minerals Ministry of Health Ministry of Lands œ Fisheries Division Ministry of Local Government Ministry of Natural Resources and Tourism Ministry of Water National Environment Management Council National Land Use and Planning Commission Tanzania Association of Non-Governmental Organizations (TANGO) Tanzania Traditional Energy and Environment Organization (TATEDO) United Nations Development Programme University of Dar es Salaam Urban Water Supply and Sewerage Authority - Mwanza Wildlife Conservation Society (WCS) World Wild Fund for Nature (WWF)

COUNTRY	**STAKEHOLDER**
UGANDA	Action for Rural Development Auxfound Environmental Awareness District Environment

Office of Jinja District Environment Office of Mukono Environment Protection and Economic Development Project (EPED) Friends of Wetlands Greenwatch IUCN - Kampala Jinja District Jinja Municipal Council Jinja Urban Wetlands Kakuto Fish Farming Kampala City Council Lugazi Peoples Enterprise Development Makerere University Institute of Environment and Natural Resources Ministry of Agriculture, Animal Industry and Fisheries Ministry of Agriculture, Animal Industry, and Fisheries - Agriculture Department Ministry of Energy and Mineral Development Ministry of Energy and Mineral Development - Directorate of Energy Ministry of Health Ministry of Tourism Trade and Industry Ministry of Water, Land and Environment Ministry of Water, Land, and Environment - Directorate of Water Development Ministry of Water, Land, and Environment - Forestry Department Ministry of Works, Transport and Communications Mukono District National Association of Professional Environmentalists National Environment Management Authority (NEMA) National Strategy for the Advancement of Rural Women in Uganda National Wetlands Program NEMA - GEF Biodiversity Conservation Project Uganda Electricity Board Uganda Environmental Protection Forum Uganda Investment Authority Uganda National NGO Forum Uganda Neem Movement Uganda Wetlands and Resource Conservation Association Uganda Wildlife Authority Uganda Women Tree Planting Movement

Annex 6

Protected Areas with Transboundary Significance[1]

BURUNDI

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
Significant Wetlands					
Lake Rwihinda Natural Managed Reserve	425	1956	Variety of migratory and sedentary bird species	Disturbance of avi-fauna due to agricul-tural activities on the shores; combretum completely degraded by agriculture	Oversight by corps of park rangers with insufficient human resources
Ruvubu wetland area			Contains significant wetland area north of Ruvubu National Park along boundary with Tanzania		
Kanyaru Valley			Located along northern border with Rwanda		
Lake Rwihinda area			Located east of Lake Rwihinda Natural Reserve and adjacent to Lake Cyohoha South, shared with Rwanda		
Nyamuswaga wetland area			Located in north central region	Agricultural cultivation	
Parks					

Kibira National Park	40,000	1934	Mountain rainforest habitat, located in NW region of Burundi bordering Rwanda's Nyungwe National Park. Home to 10 primate species and over 200 species of birds	Conflicts resulting from sawmilling of valuable trees; non-compliance with limits; clearing for agricultural land	Physical delimitation by planted trees Oversight by park rangers with very low human resources Support of local administration in monitoring riparian population's participation in protection activities
Ruvubu National Park	50,800	1982	Located in NE region of Burundi on border with Tanzania; contains over 400 bird species; includes papyrus wetland, river and tributary habitat	Poaching (hunting, trapping); arson Conflicts due to destruction of crops in adjacent farms by animals from park Partial physical delimi-tation of the park	Oversight by park rangers with insufficient human resources in view of park size Support of local administration to provide guidance for participation of riparian population in protection activities

Transboundary Protected Areas: Cross-border adjacent areas are listed indicating the respective names in each country, as shown on the maps attached to this report, such as: (a) Kibira National Park, Burundi œ Nyungwe National Park, Rwanda; (b) Virunga Conservation Area: Virunga National Park, D.R. Congo œ Volcan National Park, Rwanda œ Mgahinga National Park, Uganda; (c) Kagera National Park, Rwanda œ Ibanda Game Reserve, Tanzania; (d) Alatish Wildlife Area, Ethiopia œ Dinder National Park, Sudan; (e) Masai Mara National Reserve, Kenya œ Serengeti National Park, Tanzania; (f) Mt. Elgon National Park, Kenya œ Mt. Elgon National Park, Uganda; (g) Virunga National Park, D.R. Congo œ Queen Elizabeth National Park, Uganda.

D.R. CONGO

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
Significant Wetlands					
Lake Edward area			Located on eastern border of D.R. Congo; shared with Uganda; two significant wetlands, one in NE and the other SE of lake; both areas included in Virunga National Park		
Domaine de Kasenyi et de Semliki			Located in northeastern D.R. Congo along shores of Lake Albert, shared with Uganda.		
Parks					
Virunga National Park	810,000	1925	Located in eastern region of D.R. Congo; contiguous with Rwanda's Volcan National Park and Uganda's Mgahinga National Park, which together form transboundary Virunga Conservation Area; northern portion of Virunga National Park also shares bound-	Destruction of tourism infrastructure, deforestation, poaching, land conflicts due to war, interethnic conflicts, economic/political crisis and exceedingly high rate of population growth	Rehabilitation of Virunga National Park by ICCN-Institut Congolais pour la Conservation de la Nature

			ary with Queen Elizabeth National Park in Uganda; wildlife area con-tains extraordinary variety of natu ral habitats and is home to 14 pri mate species.		
Forest preserves and other protected areas located in Congolese part of Nile basin: total of 30 protected areas	4 million ha (Est. total surface area)		Reserves located on Congo-Nile ridge and western side of the Rift Valley; created to serve as regula-tors of hydrological and climate systems in this area of Nile basin	Infringement of agricultural activities; installation of livestock farms; illegal log ging activities.	Participation of popula tion in management of forest preserves Ministry of Environ-ment and Conserva-tion of Natural Re-sources, Fisheries, and Forests

EGYPT ETHIOPIA

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
			Significant Wetlands		
Ashtom El Gamil	1,200	1988	One of largest wetland areas in North Africa and important wet-land habitat area for birds; lo-cated in NE part of Lake Man-zala adjacent to Port Said; has received global recognition; listed as specially protected area under Barcelona Convention	Wastewater disposal in lake, urbanization and land loss to agriculture reclamation; fish farming, overfishing, hunting	Egyptian Environmental Affairs Agency (EEAA); GEF project to demon-strate engineered wet land approach for man aging one of the drains discharging to lake
Burullus	44,000	1998	Located in middle of Delta; con-tains Lake Burullus, an important wetland habitat for migratory and non-migratory birds	Wastewater disposal in lake, reclamation of wet-lands and coastal sand-bar, overfishing and hunt-ing	EEAA; through GEF-funded MedWet project, assistance for capacity building and infrastruc-ture upgrade
Wadi Rayan	175,900	1989	Located in SW part of El Fay-oum depression; two lakes of Wadi El-Rayan are manmade wetlands formed in 1973 by ex cess agriculture drainage	Area has undergone rapid development and uncontrolled tourism, rec-lamation, overfishing, fish farming	EEAA; Italian funded pro-ject for capacity building and infrastructure up-grade

			water; designated Important Bird Area (IBA)		
Lake Qarun	23,000	1989	Wintering area of international importance for water birds	Discharge of agriculture drainage water into lake; tourism development; effects of road construc- tion; land and wetland reclamation; overfishing and poaching	Ministry of Environment œ management; Ministry of Water Resources œ study of water resources; Dutch funded project; management level of protected area is low
All islands in Nile River	144 is-lands	1998	144 islands located in the Nile provide important habitat for mi-gratory birds	Urbanization; poor water quality; solid waste disposal; overfishing	No management; EEAA-Natural Protectorate De-partment intends to create management plan, including complete sur vey
Lake Nasser area			Located in south of Egypt, sig- nificant wetland area is result of Aswan High Dam and formation of Lake Nasser	Urbanization, land recla- mation	Egyptian Environmental Affairs Agency
			Parks		
Wadi Allaqi	433,100		Located in southern Egypt and stretching into Sudan, one of the largest wetland systems in eastern desert and a cultural heri- tage site	Uncontrolled hunting; overgrazing; collection of vegetation.	Egyptian Environmental Affairs Agency

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
			Significant Wetlands		
Lake Tana			Wetland area located along northeastern shores of Lake Tana in NW region of Ethiopia		
Finchaa area			Wetland resulting from hydropower dam, NW of Addis Ababa		
Dobus Swamp/ Daner River			Located at headwaters of Dabus River in western Ethiopia	Pastoralists from west Africa use wetland area	
Gambella Lowlands			Wetland area located around Gambella National Park in western Ethiopia	Refugee problem	
Alatish Wildlife area			Wetland area located in northern area of Alatish Wildlife area, which borders Sudan‘s Dinder National	Pastoralists from west Africa use wetland area	

			Park		
			Parks		
Semein Mountain National Park	17,900	1969	World Heritage site located in northern part of Ethiopia, between Blue Nile and Atbara basins; con-tains number of endemic mammals and a unique landscape	Resource conflict be-tween people and wildlife; destruction of habitats and animals	Ethiopian Wildlife Conservation Organization; efforts being made to protect both habitat and wildlife; further study proposed to be conducted with GEF sup port
Gambella National Park	506,100	1974	Located in SW area of Ethiopia near border with Sudan; considered one of the most important wildlife conservation areas in country with high number of endemic flora and fauna; northern wetland area stretches into Sudan	Seriously affected by refugees from the Sudan and encroachment by people living near park	Ethiopian Wildlife Conservation Organization; under study as protected wildlife area
Alatish Wildlife Area	Not de-fined	Proposed	Wildlife area located in Amhara region; shares a common bound-ary with Sudan's Dinder National Park; home to 36 rare bird spe cies; preserves established migra tion routes between Ethiopia and Sudan	Resource conflict be-tween wildlife and peo ple; anticipated serious degradation of both habitat and wildlife	Ethiopian Wildlife Con-servation Organization; protection system and plan being established jointly with the Sudan

KENYA RWANDA

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
			Significant Wetlands		
Saiwa Swamp National Park	250	1974	Located in western region of Kenya, contains rare Sitatunga Antelopes and Wetland crested Crane.	Overexploitation of wetland resources; human conflicts with wildlife	Kenya Wildlife Service
Ndere Island National Park	420	1986	Located in NE portion of Lake Victo-ria; home of lesser known Spotted Crocodile	Human/wildlife con-flicts	Kenya Wildlife Service
Kisumu Impala Sanctuary		1992	Located in Kisumu in SW Kenya, created to provide safe grazing ground for area's impala; part of Lake Victoria's wetland area	Human/wildlife con-flicts	Kenya Wildlife Service
Winam Gulf			Located in extreme NE bay area of Lake Victoria, near lakeshore town of Kisumu; extends from mouth of		

			Nyando River to mouth of Sondu-Miriu Rivers		
Nzoia River estuary			Located in SW Kenya along shores of Lake Victoria near border with Uganda; estuary forms part of flyway for migratory birds		
Uasin-Gishu area			Covers large area to east of Eldoret; contains small permanent wetland areas surrounded by seasonal wet-lands		
Parks					
Ruma National Park	12,000	1983	Located in western region of Kenya near Lake Victoria; created to protect only remaining habitat of Roan Antelope	Human/wildlife conflicts	Kenya Wildlife Service
Mt. Elgon National Park	16,923	1968	Located on border with Uganda in western region of Kenya; shares common border with Mt. Elgon National Park in Uganda	Human/wildlife conflicts	Kenya Wildlife Service
Masai Mara National Reserve	151,000	1950	On border with Tanzania and joins with Tanzania's world famous Serengeti National Park; part of annual wildlife migration route (especially wildebeest)	Human/wildlife conflicts	Kenya Wildlife Service and county council
Kakamega National Reserve	4,468	1985	Located in western region of Kenya near town of Kakamega; home of many rare species of primates and Kenya's only tropical rain forest	Human/wildlife conflicts	Kenya Wildlife Service and county council

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
Significant Wetlands					
Upstream Rusumu Falls			Lies along Rwanda's southeast border with Tanzania and upstream from Rusumu Falls		
Lakes Ihema, Nasho, Cyambwe, Rwampanga			Located south of Kagera National Park along border with Tanzania; Lake Ihema falls nearly entirely in Kagera National Park.		
Lake Cyohoha			Located in southern Rwanda and shared with Burundi		
Lake Rugweru			Located in southeastern Rwanda; shared with Burundi		
Lake Mugesera			Located in southeastern Rwanda		
Bugesera wetland area and Lake Cyohoha North			Located in south central portion of Rwanda; lies between Lake Cyohoha North and Lake Cyohoha South	Agriculture pressure	

			Parks		
Volcan National Park	1,500	1998	Located in NE Rwanda; designated as Biosphere Reserve; formed to protect gorilla populations; part of Virunga Conservation Area, which also contains Mgahinga National Park, Uganda and Virunga National Park, D.R. Congo	Infringement; poaching; water withdrawal and tree cutting; fires; human presence within Park; destruction of plantations by animals; lack of compensation mechanisms	Office of Tourism and National Parks of Rwanda (ORTPN) PICG DFGF International
Akagera National Park	850,000	1999	Located in eastern Rwanda along Tanzanian border; northern portion of Park shares border with Ibanda Game Reserve in Tanzania; park contains Lakes Rwanyakizinga, Mihindi, Hago, Ki-yumba, and most of Lake Ihema	Destruction of two thirds of old park by population in need of resettlement sites and agricultural land	Office of Tourism and National Parks of Rwanda (ORTPN) Ministry of Commerce, Industry and Tourism (MINICOM) Ministry of Land, Rehabilitation and Environmental Protection (MINITERE)
Nyungwe Natural Forest	90,000	1999	Located in SW region of Rwanda; shares common border with Kibira National Park in Burundi	Clearing for agriculture; bush fires; overexploitation of biological resources; hunting; poor distribution of forest; lack of alternatives for agri-cultural riparian population; gold washing, sawmilling	ORTPN, in collaboration with PCFN

SUDAN TANZANIA

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
			Significant Wetlands		
The Sudd Wetland	1,650,000		Starts at Bor town in south and con-tinues north until meeting of Rivers Bahr El Jebel and Bahr El Ghazal;	Agricultural development; engineering work started, but	No protection at present

			considerable number of migratory birds use area	halted by conflict	
Machar Wetland	90,000		Situated north of Sobat River, vast area of swamps and floodplain intersected by intricate system of watercourses and numerous lakes; contains extensive grassy flood-plains and permanent herb swamps	Grazing by pastoral-ists; poaching	No protection at present
Dinder/ Rahad Wetland	500,000		Floodplain occupying area between Dinder and Rahad Rivers, both flowing from Ethiopian highlands; tributaries with numerous oxbow lakes lie between the rivers and much of the intervening land flooded during rainy season; swampy area around lakes, la-goons, pans, pools and depres sions form good grazing sites for wildlife during dry season; important migratory and water birds	Trespassing by no-mads for grazing and firewood; poaching and illegal hunting	GEF/UNDP funded project underway to build capacity and establish manage-ment plan
Shambe National Park	62,000	1985	Floodplain grasslands	Poaching and illegal use of resources	Ministry of Environment and Tourism œ Wildlife Department; no comprehensive management plan
Parks					
Dinder National Park	890,000	1935	On Sudan's eastern border with Ethiopia; preserves natural wildlife migration corridor between Sudan and Ethiopia	Use of park resources and frequent trespass-ing by nomads	Ministry of Environment and Tourism œ Wildlife Department; supported by GEF/ UNDP project
Killepo Game Reserve	120,000	1975	Lies on border with Uganda; Ugandan side park area has complete protection	No information avail-able about potential pressures, conflict	No protection at present; (Ministry of Environment and Tourism œ Wildlife Department)
Nimule National Park	41,000	1954	Located on Sudan‘s southern border on western side of River Bahr El Jebel on border with Uganda; contains variety of bird, reptile and mammal species		Previously com-pletely protected; no protection at present; (Ministry of Environment and Tourism œ Wildlife Department)
Shambe National Park	62,000	1985	Floodplain grasslands	Poaching and illegal use of recourses by community	No comprehensive management plan; (Ministry of Envi-ronment and Tour ism œ Wildlife De partment)

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
			Significant Wetlands		
Minziro Forest Reserve	26,500	1974	Semi-swamp area that shares a border with Uganda; home to rare species including mangabey monkey	Cutting of trees for building materials, medicine, firewood and charcoal	Ministry of Natural Resources and Tour-ism and town councils
Rumanyika Game Reserve	80,000		Located in northeast and shares a border with Rwanda; lies within Kagera watershed	Poaching and illegal harvesting of timber; uncontrolled fire	Ministry of Natural Resources and Tour-ism and town councils
Chabula Marsh	10,000				
Simiyu River wetland system			Lies near southeast shores of Lake Victoria along the Simiyu River		Ministry of Natural Resources and Tour-ism; regional authorities in Mwanza, Mara and Kagera
Lake Victoria			Lake Victoria is shared by the three countries of Kenya, Tanzania, and Uganda; Nearly half of the lake falls within the northern regions of Tanzania		Ministry of Natural Resources and Tour-ism; regional authorities in Mwanza, Mara and Kagera
			Parks		
Serengeti National Park	1,476,300	1951	Located in NE Tanzania ; shares border with Kenya's Masai Mara National Reserve; in the Mara region with portion of park within Lake Victoria watershed	Poaching	Tanzania National Parks Authority
Ibanda Game Reserve	20,000	1974	Located in extreme NW region of Tanzania; shares borders with Uganda and Rwanda; portion of reserve shares border with northern portion of Rwanda's Kagera National Park	Poaching and illegal harvesting of timber; uncontrolled fire	Ministry of Natural Resources and Tour-ism and town councils
Gurmeti Game Reserve	297,300			Poaching and bush fires	Ministry of Natural Resources and Tour-ism and town councils
Bugiri Game Reserve	220,000	1980	Located in NE region of Tanzania just south of Lake Victoria, near borders of Rwanda and Bu-rundi	Poaching and bush fires	Ministry of Natural Resources and Tour-ism and town councils
Rubondo Island Game Reserve	45,600		Located in NE region of Tanza-nia just south of Lake Victoria, near borders of Rwanda and	Poaching and bush fires	Ministry of Natural Resources and Tour-ism and town coun

			Bu- rundi		cils
Moyowosi Game Reserve	600,000	1982	Located in western Tanzania ad- jacent to Lake Tanganyika; shares border with Rwanda	Encroachment and bushfires	Ministry of Natural Resources and Tour- ism and town coun cils

UGANDA

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
Significant Wetlands					
Queen Elizabeth National Park	197,800	1952	Contiguous with Kibali National Park, Uganda and Virunga National Park, D.R. Congo; recognized as a World Biosphere Reserve, includes a Ramsar wetland site, and is clas- sified an Important Bird area - home to ³ of Africa's bird species	Twelve fishing villages in park with approxi-mately 15,000 people; problem with poaching	Uganda Wild-life Authority.
Lake Victoria	6,900,000 (total)		Located in south and southeast area of Uganda; shared with Kenya and Tanzania; largest freshwater lake in Africa	Point and non-point source pollution; depletion of biodiversity; water hyacinth infestation	Dept. of Fisher-ies; Dept. of Water; LVEMP
Lake Victoria wetland system			Located on northwestern tip of Lake Victoria along border with Kenya	Land use pressure; uncontrolled use of resources; lack of com munity based wetland management	
Lake George			Located in southwestern region of Uganda; contains a Ramsar site; western shores border Queen Elizabeth National Park	Pollution from mining	
Lake Edward			Located in southwestern border of Uganda and shared with D.R. Congo; nearly completely sur- rounded by protected areas		
Lake Albert			Located along western border and shared with D.R. Congo.	Threatened by eutrophication due to land use activities in catch ment	
Lake Kyoga	630,000		Located in central region of Uganda; due to shallow depth, en-tire lake exhibits wetland character- istics; portions of area proposed for Ramsar site	Siltation from land based activities; heavy pressure from rice growing	Dept. of Fisher- ies; Dept. of Water

Nile River			Along Nile River, wetland systems run through Uganda into Sudan	Threatened by agricultural expansion due to population increase; very little known information on Nile River wetland system	
Minziro œ Sango Bay Swamp Forest			Located in southern Uganda in Riva Kagara wetland system west of Lake Victoria; shares border with Tanzania	Land use pressures; encroachment; uncontrolled area leading to over-exploitation of resources	
			Parks		
Bwindi Impenetrable Forest National Park	33,100	1992	Located in SW corner of Uganda near border with D.R. Congo; contains high diversity of birds; provides home to 1/2 the world's population of rare Mountain Gorilla	Intensive cultivation to edge of park	Uganda Wildlife Authority
Kibale Forest National Park	74,000	1993	Located in western region of Uganda near Rwenzori Mountains National Park; home to enormous variety of primates and 325 bird species, many of which are endemic	Rampant poaching; small areas settled in southern portion of park	Uganda Wildlife Authority
Kidepo Valley National Park			Located in northeast Uganda along border with Sudan	Traditional warriors create security concerns that undermine management authorities; Difficult to enforce laws	Uganda Wildlife Authority

Name	Size (ha)	Year	Site Description and Regional Significance	Impacts and Conflicts	Current Management
Matheniko Game Reserve			Located in northeast region of Uganda, this park shares a border with Kenya	Traditional warriors create security concerns that undermine management authorities; difficult to enforce laws	Uganda Wildlife Authority
Mhahinga Gorilla National Park	2,500	1991	Located in SW region of Uganda bordering D.R. Congo and Rwanda; home to mountain gorilla and golden monkey	Intensive cultivation to edge of park	Uganda Wildlife Authority
Mt. Elgon National Park	119,200	1993	Located in eastern region of Uganda; shares border with Kenya's Mt. Elgon National Park; highland water catchment area that supports downstream wetland sys	Large mammal populations drastically reduced by hunting; intensive land demands by surrounding com	Uganda Wildlife Authority

			tems of Lake Kyoga	munities	
Murchison Falls National Park	385,000	1954	Located in mid-western region of Uganda, north of Lake Albert; considered site of international importance with high diversity of large mammals and bird species	Poaching in northern area of park; fishing activities too close to park boundary	Uganda Wildlife Authority
Rwenzori Mountains National Park	98,000	1993	Located in western region of Uganda sharing a border with D.R. Congo; World Heritage Site; high altitude forest containing large number of endemic species	Large mammals severely depleted by hunting; insecurity due to rebel activity, which undermines management	Uganda Wildlife Authority
Lake Mburo National Park			Located in southwest Uganda	Traditional grazing of pastoralists	Uganda Wildlife Authority
Semuliki National Park	21,400	1993	Located in western Uganda and borders D.R. Congo; contains large game habitat	Intensive agriculture to edge of park	Uganda Wildlife Authority

Annex 7

Commitment to International Conventions

Convention	BI	CD	EG	ET	KE	RW	SD	TZ	UG
African Convention on the Conservation of Nature and Natural Resources, Algiers (1968)		E:1976	S:1968 R:1972 E:1972		E:1969	E:1980	E:1973	E:1974	E:1977
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (1999)			S:1997 R:1999				S:1996 R:1996	R:1999	
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	A:1997	A:1994 E:1995	A:1993 R:1993 E:1993	1989				A:1993 E:1993	A:1999
Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris (1972)	R:1982	R:1974	R:1974 E:1975	R:1977	A:1991 R:1991		R:1974	R:1977	A:1987
Convention for the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and their Destruction, London (1972)		E:1975	S:1972	E:1975	R:1976 E:1976	E:1975			E:1992
Convention on Biological Diversity (1992)	S:1992 R:1997	S:1992 R:1994 E:1995	S:1992 R:1994	S:1992 R:1994 E:1994	S:1992 R:1994 E:1994	S:1992 R:1996 E:1996	S:1992 R:1995 E:1996	S:1992 R:1996 E:1996	S:1992 R:1993 E:1993
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1973)	A:1988 E:1988	A:1976 E:1976	S:1994 A:1978 E:1978	A:1989 E:1989	R:1978 E:1979	A:1980 E:1981	R:1982 E:1983	R:1979 E:1980	A:1991 E:1991
Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa, Bamako, Mali (1991)	S:1991	S:1994	S:1991	1991		S	S	1993	S

Convention on the Conservation of Migratory Species of Wild Animals, Bonn (1979)		E:1990	S:1979 R:1982 E:1983		1999			1999	
Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar (1971)		E:1996	R:1988 E:1988		S:1990 R:1990 E:1990			E:2000	E:1988
UN Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification particularly in Africa (1994)	S:1994 R:1997 E:1997	S:1994 R:1997 E:1997	S:1994 R:1995 E:1996	S:1994 R:1997 E:1997	S:1994 R:1997 E:1997	S:1995 R:1998 E:1999	S:1994 R:1995 E:1996	S:1994 R:1997 E:1997	S:1994 R:1997 E:1997
Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora (1994)				1994 E:1996	S:1994 E:1996			1994 E:1996	E:1996
Montreal Protocol on Substances that Deplete the Ozone Layer (1987)	C:1997	C:1994	S:1987 R:1988 E:1993	C:1994 E:1995	S:1987 R:1988 E:1989		C:1993 E:1993	C:1993 E:1993	S:1988 R:1988 E:1989
Phyto-sanitary Convention for Africa, Kinshasa (1967)	E: 1992		E: 1968	E: 1974		E: 1981			
UN Convention on the Law of the Sea (1982)	S	S R:1989 E:1994	S:1982 R:1983 E:1994	S	S:1982 R:1989 E:1994	S	R:1985	R:1985 E:1994	R:1990 E:1994
UN Framework Convention on Climate Change (1993)	R:1997	R:1995 E:1995	S:1992 R:1994 E:1995	R:1994 E:1994	S:1992 R:1994 E:1994	R:1998	E:1994	R:1996 E:1996	R:1993 E:1994
Vienna Convention for the Protection of the Ozone Layer	C:1997	C:1994 E:1995	S:1985 R:1988 E:1988	C:1994 E:1995	S:1985 C:1988 R:1988 E:1989		C:1993	C:1993 E:1993	C:1988 E:1988

BI: Burundi; CD: D.R. Congo; EG: Egypt; ET: Ethiopia; KE: Kenya; RW: Rwanda; SD: Sudan; TZ: Tanzania; UG: Uganda
S: Signed; A: Accepted; C: Accession; R: Ratified; E: Entry into Force

Annex 8

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Annex 9

Stakeholder Involvement and Participation

The Transboundary Environmental Analysis (TEA) was prepared through a highly participatory and transparent process to ensure maximum consultation and involvement that in turn would translate into maximum relevance, ownership and commitment.

The decision to carry out a process of environmental analysis was taken by the Nile Basin Initiative‘s Council of Ministers for Water Affairs, based on the recommendations by the Nile Technical Advisory Committee (TAC) at meetings held in Addis Ababa in May 1999, which prepared the strategic guidance for the overall Shared Vision Program. Following further fine-tuning of the Shared Vision Program, the Nile-TAC, under the guidance of the Nile-COM, prepared the final documentation to initiate the process in October 1999.

During OctoberœNovember 1999, the national Ministries of Water Affairs consulted with their national environment authorities for the nomination of a National Environment Expert from each of the nine countries who would serve as National Expert and Drafting Group member. The Transboundary Environmental Analysis process was formally launched with a one-week workshop in December 1999 at the Nile Basin Secretariat in Entebbe, Uganda. During this workshop, participants from each of the Nile countries studied GEF guidelines and operations, and started initial identification of common Nile-related transboundary environmental priorities.

The National Experts participated in this workshop, together with UNDP and World Bank staff. Members of the TAC participated in several of the workshop sessions. One of the key workshop outputs was a preliminary characterization of the major basin-wide environmental threats by the national experts. The workshop participants also agreed on a basic approach and methodology for the process ahead; decided to hold broad national consultations in each of the nine countries to ensure that the report would reflect national concerns and priorities; agreed on the format for the National Report (see national report summaries annex) which each National Expert would produce; and, finally, committed to a challenging work plan for the following six months. With this workshop the critical process of working together on shared environmental concerns at an operational level began for the riparian countries. This complemented the commitment to political cooperation that had already been established through the Nile Basin Initiative.

The national consultation process varied between countries, reflecting national traditions and preferences as well as the nature of individual Nile basin issues within each country. In each case the National Experts started by identifying the major stakeholder groups. The national ministries or departments responsible for water resources and for environment were usually facilitators of the consultation as well as being important stakeholders themselves. Other key stakeholders included national government agencies responsible for natural resources and for planning, local government agencies, national and local NGOs, universities and other research institutions, participants in related projects and programs, and selected individual experts (see Annex 5 for a list of stakeholders involved in the national consultations).

At least one stakeholder workshop was held in each riparian country between January and April 2000. All of the workshops were led by the national Nile TAC representative and many had ministerial-level participation. The workshops served the dual purpose of explaining the relatively complex context for and background to the consultations, ensuring that the Nile Basin Initiative itself was well understood, and soliciting inputs and suggestions on environmental priorities. In some cases workshop participants were able to respond to early drafts of the national reports. In all cases the workshop participants were encouraged to contact the National Experts directly to request information about progress or to provide further inputs. In countries where the national capital is outside the Nile basin, the National Experts traveled to the Nile basin region of their countries for consultations. In some cases additional workshops or briefings were conducted for NGO groups.

The national workshops were generally very well received by the stakeholders, especially in those cases where important stakeholder groups had not had previous opportunities to exchange their views with other stakeholders in such a forum. Although resource and time constraints necessarily limited the scope and reach of the national consultations, all of the riparian countries had previously undertaken comparable national environmental planning processes aimed at diagnosing and prioritizing environmental problems. These include National Environmental Action Plans, National Conservation Strategies, Desertification National Action Plans, National Biodiversity Strategies and Action Plans, Tropical Forestry Action Plans, etc. Many of these processes had themselves been based on broad consultations.

The National Experts prepared their national reports to reflect the results of the consultations as well as prior analytical work done in their respective countries. These reports in draft form were made available to and reviewed by the stakeholders who had participated in the consultations. By March 2000, the National Reports were received from each of the nine countries and a second workshop for the National Experts was then held in Entebbe. The purpose of this workshop was to review the environmental analysis in each of the reports and begin to identify common themes and priorities, around which joint and common environmental management action could be taken.

Following the March 2000 workshop, a draft Consolidated Report was produced and shared with the Nile-TAC members and the National Experts. This was followed by a final workshop held in Addis Ababa in July 2000, during which the Consolidated Report and the project action components were carefully reviewed and revised to fully reflect the national and ba-sin-wide agreed priorities.

Throughout the process, policy guidance was provided by the national Nile-TAC members and close interaction took place between the Nile-TAC member and the National Expert. Moreover, the Nile Secretariat provided administrative and logistical support and facilitated links to related NBI activities, while UNDP and World Bank staff provided technical guidance. Coordination between the countries was provided by an international Lead Consultant who also prepared the Consolidated Report based on the national findings and recommendations. The core funding for these activities was provided by the Global Environment Facility. Additional funding was provided by UNDP and the World Bank.

A parallel set of activities supported by USAID involved the preparation of a scoping study for a multi-country technical background paper based on readily accessible and public domain information. This activity was carried out by a US based consulting team that consulted with stakeholders in Burundi, D.R. Congo, Egypt, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The National Experts worked closely with the consulting team during their country visits. The National Experts reflected some of the results of this scop

ing study in the consolidated Transboundary Environmental Analysis report.

The impressive collaboration between the riparian countries‘ Experts laid a promising foundation for the detailed design and implementation of the transboundary project activities proposed as a result of the Transboundary Environmental Analysis.

Annex 10

Background

The Nile Basin Today. The Nile River is one of the world‘s great assets. From ancient human civilizations until today, the flows of the river system have nourished livelihoods and played a central role in a rich diversity of cultures. Evidence of enduring human endeavor is apparent throughout the Basin. While this endeavor has brought significant benefits, the task of developing and managing the Nile River sustainably for the Basin‘s peoples is not over. Famine, extreme poverty, instability, rapid population growth, and deteriorating natural resources are characteristic features of the Basin today. Half of the Nile basin states are among the 10 poorest in the world. To face these challenges requires visionary and courageous leadership, as well as the emergence of a regional perspective on management and development of the River.

Nile Basin Challenges. A significant feature of the Nile River is its transboundary nature. Ten riparian countries share the River: Burundi, Democratic Republic of Congo (D.R. Congo), Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda. This transboundary character poses a great challenge: that of achieving truly sustainable management of a river system whose development potential has created varying aspirations and expectations among so many different peoples living both within and beyond the Basin. At the heart of such a challenge is the imperative of poverty eradication. The sustainable development of the Nile River can help alleviate poverty by providing enhanced food, power and water security and associated employment creation. The challenge is intensified by the Basin‘s increas-

ing populations, urbanization, and industrialization.

Nile Basin Opportunities. This challenge also provides an opportunity œ the opportunity to promote regional economic development in one of the poorest regions of the world. Above Aswan, the Nile is one of the least developed rivers on the globe. There is an opportunity to transform the Nile, through collaborative and visible actions on the ground, into a unifying force that builds regional and international interdependencies and promotes economic activities, which could enable basin states to participate as partners in emerging regional and global trade. Effective water management can bring benefits to all involved riparians, which means that there is a real ”win-win‘ potential in the Basin. Unilateral development of the river is likely to engender unsustainable development, which in the long run could prove to perpetuate poverty and promote dispute.

The Nile Basin Initiative

Evolving Regional Cooperation. Appreciating the benefits of cooperation, various sub-groups within the Nile basin have engaged in cooperative activities over the past thirty years. One of the early regional projects in the Nile basin was Hydromet, which was launched in 1967 to foster the joint collection of hydrometeorologic data. Hydromet operated until 1992. In 1993, the Technical Cooperation Committee for the Promotion of the Development and Environmental Protection of the Nile Basin (TECCONILE) was formed in an effort to focus on a development agenda. Also in 1993, the first in a series of ten CIDA-supported Nile 2002 Conferences was launched to provide an informal mechanism for riparian dialogue and the exchange of views between countries, as well as with the international community. Within the framework of TECCONILE, a Nile River Basin Action Plan was prepared in 1995 with support from CIDA. In 1997, the World Bank agreed to a request by the Nile Council of Ministers of Water Affairs to lead and coordinate donor support for its activities. Thus, the World Bank, UNDP, and CIDA began operating in concert as ”cooperating partners‘ to facilitate dialogue and cooperation among the riparians, to create a climate of confidence within which an inclusive mechanism for working together could be established.

Towards A Long-Term Legal and Institutional Framework. Aware that forward movement on Nile cooperation requires both an institution and agreement on the core legal principles, the Nile riparians established a forum for a process of legal and institutional dialogue in 1997, with UNDP support. With teams of three from each country (typically senior government lawyers and water resource specialists) a —Panel of Experts“ (POE) produced the draft text of a —Cooperative Framework“ in early 2000. This encompasses general principles, rights and obligations, and institutional structure. The draft framework has moved the riparians a long way and important compromises have been reached. However, some key issues remain to be resolved, and the Council of Ministers agreed in August 2000 to extend the dialogue process to seek further agreement on the outstanding issues. UNDP has pledged its continued support to the process œ a process which by its very nature requires time and effort.

Establishment of the Nile Basin Initiative. In 1998, recognizing that cooperative development holds the greatest prospects of bringing mutual benefits to the region, all riparians[1] (except Eritrea) joined in a dialogue to design a transitional institutional

[1] Eritrea attended its first Council of Ministers meeting in August 2000 and indicated it will start participating in the Nile Basin Initiative in an observer capacity.

mechanism until a permanent cooperative framework is in place. In an historic step, together they conceived an inclusive mechanism that for the first time includes all riparians as equal members and creates a regional partnership to facilitate the common pursuit of sustainable development and management of Nile waters. The transitional mechanism, which was officially launched in February 1999 in Dar es Salaam, is comprised of the Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM), a Technical Advisory Committee (Nile-TAC), and a Secretariat (Nile-SEC). In May 1999, the overall process was officially named the Nile Basin Initiative (NBI).

Developing a Shared Vision and Objectives. Following extensive consultations, the Nile-COM, at its Extraordinary Meeting in February 1999, adopted a Shared Vision and policy guidelines for the NBI. The Shared Vision is:

> *To achieve sustainable socio economic development through the equitable utilization of, and benefit from, the common Nile basin water resources.*

The policy guidelines, which provide a ba-sin-wide framework for moving forward with cooperative action, set forth the primary objectives of the NBI:

. • To develop the water resources of the Nile basin in a sustainable and equitable way to ensure prosperity, security, and peace for all its peoples
. • To ensure efficient water management and the optimal use of the resources
. • To ensure cooperation and joint action between the riparian countries, seeking win-win gains
. • To target poverty eradication and promote economic integration.

The NBI Strategic Action Program. To achieve the Shared Vision, the riparians are developing a *Strategic Action Program*, which focuses on two complementary ideas œ *a Shared Vision* and *action on*

the ground (Figure 1). The ideas are mutually reinforcing. A common vision provides a framework for activities on the ground, and, in turn, these activities realize

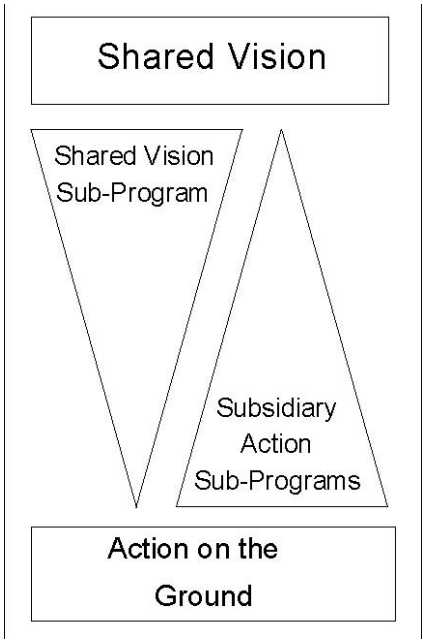
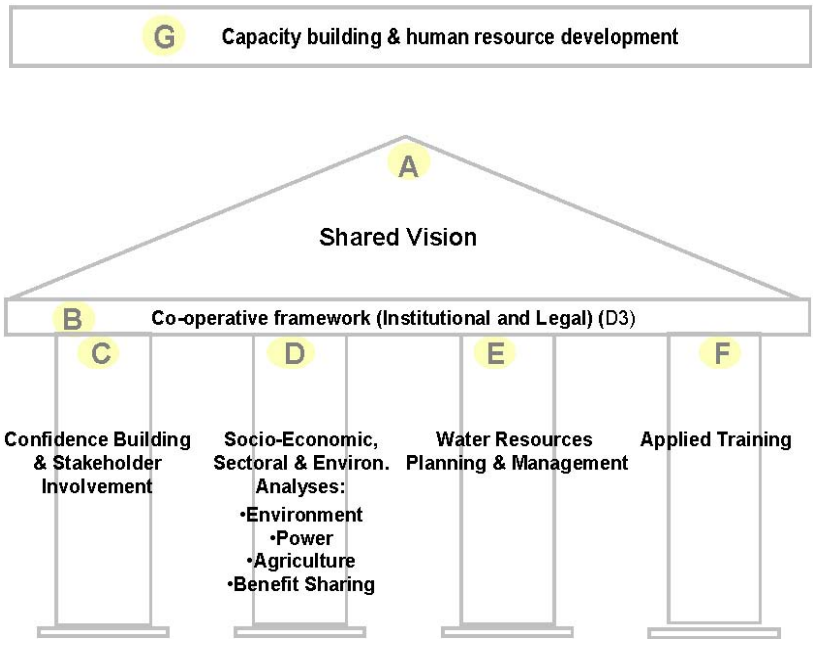


Figure 1. Strategic Action Program for the Nile

the vision. These ideas will be translated into actions through two complementary sub-programs: (i) a basin-wide Shared Vision Program to create a coordination mechanism and —enabling environment‘‘ for cooperative action and (ii) Subsidiary Action Programs which would plan and implement action on the ground at the lowest appropriate level, taking into account benefits and externalities of planned activities in other countries.

Shared Vision Program (SVP). The primary purpose of the SVP is the creation of an —*enabling environment*“ for investments and action on the ground, within a basin-wide framework. The



SVP, as originally conceived, comprised five broad theme areas as illustrated in Figure 2:

. • Cooperative Framework (Project D3, ongoing) [B]
. • Confidence building and stakeholder involvement [C]
. • Socioeconomic, environmental, and sectoral analyses [D]
. • Water resources planning and man agement [E]
. • Applied training [F]

The Shared Vision (A) is underpinned by a cooperative framework (B). The Cooperative Framework Project D3, supported by UNDP, is building such a regional framework. Supporting this ”roof‘ are four major basin-wide theme areas [C-F], which are the ”pillars‘ of the basin-wide SVP. Other activities will be added as they are needed and agreed upon. All activities within these tasks have a major capacity building component and contribute to human resources development within the basin œ this provides the ”foundation‘ of the proposed program (G).

Figure 2. Basinwide Shared Vision Program

The SVP was intended to promote the Shared Vision through a limited but effective set of basin-wide activities and projects. Based on the work of seven SVP working groups, each of which include a Nile-TAC member and sector experts from the NBI countries, a portfolio of seven priority SVP projects has been formulated through a unique multi-country, multi-sectoral, participatory process. The portfolio includes four sectoral projects œ environmental management, power trade, efficient use of water for agriculture, and water resources planning and management œ and three crosscutting projects related to confidence building and stakeholder involvement, applied training, and benefit sharing and integration. The sectoral projects aim to provide a technical foundation, including common analytical frameworks, practical tools and demonstrations, and human capacity, to support regional cooperation, while the crosscutting projects serve to forge a common vision and ensure long-term sustainability. The project titles and objectives are summarized in Table 1. The current focus of the SVP is to fully formulate these projects and prepare them for financing of project implementation.

Subsidiary Action Programs (SAPs).

Within the basin-wide framework, SAPs will be prepared by groups of two or more countries œ where all affected countries have the opportunity to participate. Subsidiary Action Programs will comprise actual development projects at the sub-basin level. These programs will translate the — Shared Vision" into concrete activities and seek to realize transboundary development opportunities. Currently, the Nile riparians have formed two SAPs. The Eastern Nile (ENSAP) includes Egypt, Sudan and Ethiopia; while the Nile Equatorial Lakes Region (NELSAP) includes the six countries in the southern portion of the Basin œ Burundi, D.R. Congo, Kenya, Rwanda, Tanzania and Uganda, in collaboration with Egypt and Sudan as downstream riparians. The current focus of the SAPs is to identify cooperative projects which warrant further investi-

Table 1. Overview of the Shared Vision Program Project Portfolio

FUNCTION	TYPE	PROJECT	OBJECTIVES
Creating an enabling environment for cooperative development: • Basin-wide engagement and dialogue • Common strategic and analytical frameworks • Practical tools & demonstrations • Institutional and human capacity building	THEMATIC	1. Nile Transboundary Environmental Action	Provide a strategic framework for environmentally sustainable development of the Nile River Basin. Support basin-wide environmental action linked to transboundary issues in the context of the Nile Basin Initiative strategic action program
		2. Nile Basin Regional Power Trade	Establish the institutional means to coordinate the development of regional power markets among the Nile Basin countries.
		3. Efficient Water Use for Agricultural Production	Provide a sound conceptual and practical basis to increase availability and efficient use of water for agricultural production.
		4. Water Resources Planning and Management	Enhance the analytical capacity for basin-wide perspective to support the development, management, and protection of Nile Basin waters.
	FACILITATIVE	5. Confidence Building & Stakeholder Involvement (Communications)	Develop confidence in regional cooperation under the NBI and ensure full stakeholder involvement in the NBI and its projects.
		6. Applied Training	Strengthen institutional capacity in selected subject areas of water resources planning and management in public and private sectors and community groups. Create or strengthen centers with capacity to develop and deliver programs on a continuing basis.

		7. Socio-Economic Development and Benefit Sharing	Strengthen Nile River Basin-wide socio-economic cooperation and integration through: (i) joint identification, analysis, and design of cooperative development options and priorities (ii) development of criteria, methods, and frameworks for sharing benefits/costs, and managing attendant risks

gation and detailed project preparation. place within a sub-basin context, encom-Table 2 summarizes some types of projects passed in the broader basin-wide frame-identified by the riparians for ”bundling‘ work. The basin-wide framework will also into subsidiary action programs. include an ”international discourse‘ to

Table 2: Types of Projects for Consideration in Subsidiary Action Programs

I. Generic Water Resources Management Project Possibilities

- Water Supply & Sanitation
- Irrigation and Drainage Development
- Fisheries Development
- Hydropower Development and Pooling
- Watershed Management
- Sustainable Management of Wetlands and Biodiversity Conservation
- Sustainable Management of Lakes and Linked Wetland Systems
- River Regulation
- Flood Management
- Desertification Control
- Water Hyacinth and Weed Control
- Pollution Control and Water Quality Management
- Water Use Efficiency Improvements

II. Other Related Joint Development Project Possibilities

Infrastructure

- Regional energy networks, including power interconnection and gas pipelines
- Telecommunication development
- Regional transport, including railway and road networks, river and marine navigation, aviation

Trade and Industry

- Promotion of trade (including border trade)
- Industrial development
- Regional tourism development
- Promotion of private investment and joint ventures
- Marketing and storage of agricultural products
- Forest crop harvesting

Health, Environment, Other

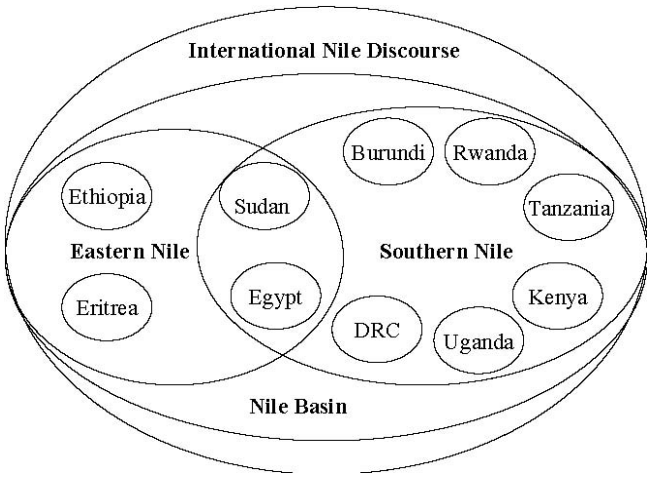
- Malaria and other endemic disease control
- Protection of wildlife
- Environmental management
- Disaster forecasting and management

Riparian Consultative Process. The Nile-promote international support for sustain-COM is the main policy and guidance fo-able development and management of Nile rum for Nile basin cooperation. An impor-waters. tant role of the Nile-TAC is to coordinate

joint activities

The International Consortium for Coop-

and establish working groups as needed to accomplish specific *eration on the Nile (ICCON).* As soon as the first set of priority projects within the tasks. The Nile-TAC is responsible to the Strategic Action Program have been for-Nile-COM for the preparation of the SVP, which will be coordinated and implemented at the basin-wide level. While the Nile-T AC pro m otes establishment of working groups of concerned countries to identify SAP projects at the sub-basin level, the responsibility for SAPs will rest with the involved riparians. Throughout the process, high priority will continue to be placed on strengthening the process of consultation in order to build trust and confidence. **Figure 3. Possible Levels of Nile Cooperation** Figure 3 illustrates how country activities will take mally prepared for funding, the World Bank, in cooperation with its donor partners, will host a first ICCON meeting. The purpose of the ICCON is to seek coordinated and transparent support for cooperative water resources development and management and other related projects in the Nile basin. The process would facilitate transboundary projects that are difficult to realize in a single country context, and provide incentives to pursue Nile development within an agreed framework. Within this forum, Nile riparians will seek funding pledges for projects from bilateral, multilateral, and possibly private funding agencies. The first ICCON, scheduled for June 2001, is intended to raise financing to implement SVP projects and to continue with detailed project preparation of SAP projects.



In Closing. The Nile Basin Initiative provides a transitional institutional mechanism, an agreed vision and basin-wide framework, and a process to facilitate substantial investment in the Nile basin to realize regional socio-economic development. The NBI represents deep commitment by the Nile riparian countries to foster cooperation and sustainable development of the Nile River for the benefit of all.

Annex 11

Nile Basin Initiative Glossary

Name/Acronym	**Description**
Cooperating partners	The initial **—cooperating partners“** partners of the Nile basin countries have been Canadian International Development Agency (CIDA), the United National Development Programme (UNDP) and the

World Bank. As the **NBI** moved into the preparation of the **SVP** and the **SAPs**, other bilateral donors and international agencies actively began supporting the Initiative (Governments of Denmark, Finland, Germany, Italy, the Netherlands, Norway, Sweden, the United Kingdom, the United States, UN Food and Agricultural Organization and the Global Environmental Facility). With the first ICCON the circle of donors is expected to widen further.

Cooperative Framework

In 1997 the Nile riparians created a forum for dialogue towards establishing a permanent legal and institutional framework within the *Nile River Basin Cooperative Framework Project (D3)*, which is supported by UNDP. A Panel of Experts with three representatives from each riparian country produced a draft text of a **—Cooperative Framework“** in early 2000. The Council of Ministers agreed in August 2000 to extend the dialogue process to seek further agreement on outstanding issues. UNDP has pledged its continued support to the process.

ENSAP

The Eastern Nile Subsidiary Action Program (ENSAP) includes the Eastern Nile Countries œ Egypt, Sudan, and Ethiopia. The goal of ENSAP cooperation is to develop the water resources of the Eastern Nile Basin in a sustainable and equitable way to ensure prosperity, security and peace for all its people. See also **SAP** and **NELSAP**.

ICCON

An **International Consortium for Cooperation on the Nile (ICCON)** is being established to support the NBI‘s Strategic Action Program with a first meeting scheduled in June 2001. The ICCON will be a unique forum, organized by the World Bank at the riparians‘ request, and envisioned as a long-term partnership of the riparian states and the international community.

International Discourse

The **International Discourse** is envisaged as a forum that will facilitate an inclusive dialogue of all stakeholders (civil society, governments, private sector, academia, etc.) discussing sustainable development options in the Nile basin.

NBI

NELSAP

Nile-COM Nile-TAC Nile-SEC

Pillars

Policy Guidelines

Formally launched in February 1999 by the Council of Ministers of Water Affairs of the Nile basin countries, the **Nile Basin Initiative (NBI)**[1] includes all Nile countries in a regional partnership to fight poverty and promote socio-economic development in the region. The NBI is a transitional institutional mechanism pending the establishment of a permanent legal and institutional **Cooperative Framework.**

The **Nile Equatorial Lakes Subsidiary Action Program (NELSAP)** includes the six —southern Nile countries“ œ Burundi, Congo, Kenya, Rwanda, Tanzania and Uganda in collaboration with Sudan and Egypt, as downstream riparians. In addition to realizing the overall Shared Vision, the overall objective of NELSAP is aimed at contributing to the eradication of poverty, promoting economic growth, and reversing environmental degradation. The immediate objective is the identification of possible investment projects for submission to the International Consortium for Cooperation on the Nile. See also **SAP** and **ENSAP.**

The Nile Basin Initiative (NBI), the current transitional institutional mechanism, is comprised of the **Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM), a Technical Advisory Committee (Nile-TAC)**, and a **Secretariat (Nile-SEC).** The Nile-COM is the main policy and guidance forum for Nile basin cooperation. Important roles of the Nile-TAC are to co-ordinate joint activities and establish working groups as needed to accomplish specific tasks. The Nile-TAC is responsible to the Nile-COM for the preparation of the basin-wide Shared Vision Program. The Nile-Sec is located in Entebbe, Uganda, and is coordinating SVP activities.

The Shared Vision Program, as originally conceived, comprised 5 broad theme areas, as have been illustrated in a temple diagram (see Annex 10 above). Thus these themes are also referred to as —Pillars“. They include:

. • Cooperative Framework (ongoing) [B]
. • Confidence building and stakeholder involvement [C]
. • Socio-economic, environmental, and sectoral analyses [D]
. • Water resources planning and management [E]

. • Applied training [F].

The **Policy Guidelines** adopted by the **Nile-COM** in February 1999 govern the implementation of the Nile River Basin Strategic Action Program. The Policy Guidelines include the Nile Basin **Shared Vision** statement. See Annex 10 above.

Eritrea attended its first Council of Ministers Meeting in August 2000 and indicated its intention to participate in the Nile Basin Initiative in an observer capacity.

SAP Within the basin-wide strategic action program, **Subsidiary Action Programs** will consist of investment projects that confer mutual benefits at the sub-basin level, each involving two or more countries. This will allow translate of the Shared Vision into action. There are two SAPs, **ENSAP** and **NELSAP**.

Shared Vision The **NBI** is guided by a common **Shared Vision**, adopted by the Nile-COM in February 1999.

> *—To achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile basin water resources.“*

See Annex 10.

SVP The **Shared Vision Program (SVP)** comprises seven projects designed to create a coordination mechanism and an —enabling environment“ for the implementation of the Shared Vision through action on the ground.

TEA A **Transboundary Environmental Analysis (TEA)** was carried out by the Nile basin riparians to guide the preparation of the Nile Transboundary Environmental Action Project (part of the SVP). The TEA process included local and national consultations to help translate existing national environmental commitments and interest into regional and basin-wide analytical frameworks, and eventually basin-wide actions. The TEA report includes a collective synthesis of basin-wide environmental trends, threats and priorities and a product in terms of a set of proposed actions to be carried out under basin-wide cooperation.

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