

TECHNICAL REPORT

Environmental Threats and Opportunities Analysis

USAID/RCSA Strategy



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1. Purpose of the Assessment

The purpose of this assessment is to support the Regional Center for Southern Africa (RCSA) in its development of a Strategic Plan for FY 2004-2010 by performing an Environmental Threats and Opportunities Assessment (ETOA) within the RCSA's geographic and proposed programmatic scope of responsibility; identifying potential negative environmental impacts of proposed activities and recommending appropriate mitigation measures; identifying options to enhance the quality of the environment; ensuring compliance with the environmental provisions of the FAA; and producing an Environmental Annex to the RCSA Strategic Plan.

1.1. Legal Basis

The core environmental requirements for USAID operating unit strategic plans are spelled out in ADS 201.5.10g and accompanying supplementary references.

1.1.1. FAA SECTION 117/USAID ENVIRONMENTAL REGULATIONS

Section 117 (Environment and Natural Resources) of the FAA requires that: "Special efforts shall be made to maintain, and where possible, restore the land, vegetation, water, wildlife, and other resources upon which depend economic growth and human well-being, especially of the poor." Thus, Section 117 dictates that operating units implement their programs with an aim towards maintaining (and restoring) natural resources upon which economic growth depends, and to consider the impact of activities on the environment. The legal requirements of the FAA are reflected in the USAID Automated Directives System (ADS), Chapter 204 (Environmental Procedures), which outlines procedures and policies for the application of the Code of Federal Regulations, Title 22 (Foreign Relations), Chapter II (Agency for international Development), Part 216 (Environmental Procedures), or 22 CFR Part 216. Further, 22 CFR 216.5 requires USAID operating units to conduct their development assistance programs in ways that are sensitive to the protection of endangered or threatened species and their critical habitats.

1.1.2. FAA SECTION 118

Section 118 (e) states that: “The actions necessary in that country to achieve conservation and sustainable management of tropical forests, and the extent to which the actions proposed for support by the Agency meet the needs thus satisfied.” Section 119(d) of the Foreign Assistance Act (FAA) states that, “The actions necessary in that country to conserve biological diversity, and the extent to which the actions proposed for support by the Agency meet the needs thus identified.” Together this is a mandate for country-level strategic plans to conduct an Environmental Analysis that addresses: (a) the actions necessary to conserve biological diversity; (b) the actions necessary to achieve conservation and sustainable management of tropical forests; and (c) the extent to which the actions proposed meet the needs thus identified. While this analysis is not mandatory for regional strategic plans that cover multiple countries, the RCSA recognizes that the protection of the environment and wise management of the natural resource base are absolute requirements for successful development programs. During the concept paper parameter review, the RCSA therefore agreed to conduct an Environmental Analysis.

1.1.3. THREATS AND OPPORTUNITIES ASSESSMENT PROCESS

ADS Chapter 201 “Managing for Results: Strategic Planning” translates Sections 118 and 119 into a practical strategic planning approach and provides a priority setting framework for missions to use in determining environmental threats and opportunities. The priority-setting is intended to guide the setting of environmental strategic objectives, and to inform strategic objectives in other sectors.

1.2. Application of Legal Requirements to RCSA Strategy

The priority-setting framework provides an approach to evaluating environmental issues and their relevance to USAID’s Agency-wide strategic environmental goals, which are:

- Reducing threats to the global environment, particularly biodiversity and climate change; and
- Promoting sustainable economic growth locally, nationally, and regionally by addressing environmental, economic, and developmental practices that impede development and are not sustainable.

The priority-setting process, here termed an Environmental Threats and Opportunities Analysis, includes three steps: assessment of environmental problems within the RCSA’s geographic and proposed programmatic scope of responsibility; evaluation of proposed activities and effectiveness of mitigation measures; identification of options to enhance the quality of the environment.

1.2.1. APPLYING FAA SECTIONS 118 AND 119

The intent of Sections 118 and 119 is that USAID give priority consideration to tropical forestry and biodiversity in its development programs. It is felt that an appropriate level of analysis would serve to inform and strengthen the RCSA strategy. The analysis approach taken must consider RCSA's regional role, and the geographic overlap with USAID country programs. If both the regional and bilateral operating units equally apply the analysis requirements, the geographic overlap means that there will be duplication of efforts. Therefore, as part of its regional perspective, RCSA must consider the response of individual bilateral mission strategies and programs to national and regional environmental threats, and the collective regional USAID bilateral response to those threats.

1.2.2. APPLYING FAA SECTION 117 AND THE ADS (INCLUDING REG. 216)

Section 117 and Reg. 216 is to ensure that USAID consider the environment in the planning of activities. In terms of RCSA's own programs (i.e., regional activities managed by RCSA), this means considering the environmental implications of planned activities in terms of both potential impacts and perhaps more strategically important, opportunities for linking and integrating environmental concerns and activities into all elements of RCSA's development program. RCSA also has the critical responsibility and strategic opportunity for promoting environmentally sustainable development across the RCSA region in its role of assisting and monitoring regional compliance with Reg. 216 and associated guidance. This role applies to RCSA bilateral mission programs, RCSA's own regional portfolio, and can incorporate broader opportunities for building capacity in environmental assessment across the region. Therefore, this Assessment will also consider this RCSA "Core Support Service" in terms of an opportunity to promote integration of environmental concerns into RCSA national and regional development.

1.2.3. THE ASSESSMENT

The remainder of this assessment is divided into two sections. Section 2 provides an overview of environmental threats and opportunities from country and thematic perspectives. Section 3 reviews the context for RCSA's actions, and considers each component of the strategy in terms of environmental issues, including appropriateness of strategic choices, potential impacts of activities, issues of environmental compliance, and opportunities for integrating and linking environmental activities and considerations both within RCSA's portfolio and with other USAID activities in the region.

2. Southern Africa Region Environmental Threats and Opportunities

2.1. Southern Africa Country Profiles

This section of the report introduces the reader to the salient features of the SADC countries and their environments. It is deliberately brief, and intended merely to set the scene for the discussion of common regional environmental threats and opportunities that follows it. Lengthier country profiles will be provided on an accompanying CD to be submitted to RCSA with the final draft.

By way of introduction, it can be stated immediately that the environmental literature on SADC (e.g., SADC 1994) repeatedly draws attention to the following four problems that may be viewed as pertinent to all its countries:

- Deforestation;
- Desertification;
- Soil erosion; and
- Decline in biological diversity.

Over the past few years, climate change with its potential impacts of sea level changes, reduced water resources, extreme weather events, eroded food security and increased health risks from vector borne diseases, and of course with its scope for interplay with the four factors previously listed, has been added to the list.

2.1.1. ANGOLA

Angola should be a country of prosperous people and a thriving environment. It is potentially one of Africa's richest countries. Roughly the same size as South Africa, it has a population of only 12 million and abundant minerals, a climate and soils that are suitable for a wide range of crops, and offshore fisheries.

Unfortunately, Angola is not a country of prosperous people and a thriving environment. The country's recent history of two decades of civil war dominates its present condition. Starting primarily as an ethnic conflict exacerbated by class divisions and Cold War ideological rivalries, the war subsequently came to be fueled by large-scale criminal enterprise. The two main political parties exploited respectively the country's large oil and diamond exports, using the revenues to sustain their armies and themselves. The result has been widespread environmental devastation and human misery – much of the latter environmentally related in the form of famine, disease and malnutrition. Roughly a quarter of the population have fled from their rural homes to the major cities or neighboring countries, losing their possessions and means of livelihood. Many people live in informal settlements without basic infrastructure and services. A major issue for economic policy is how to engage more of them in the development process.

Angola has rich mineral resources. Many commentators have noted the irony that it is precisely this wealth and the struggle to control it that has led to the present poverty of the country's people. "First, exploiting the non-renewable raw materials has enabled the leaders of the two contending parties in the civil war to fuel the conflict and pay for their struggle for power. Second, the level of wealth available from (oil and diamonds) is such that it allows the two contenders to remain relatively immune from both international and internal pressure. Thirdly, and most tellingly, the wealth of the country is such that it has proved impossible to create a sufficiently strong consensus and commitment within the international community to encourage both a longstanding peace between the two sides and the adoption of a macroeconomic stabilization package that can restore some sanity to the Angolan economy, to the eventual benefit of its people. The mineral wealth has corrupted all those involved." (Munslow B. 1999. 'Angola: The politics of unsustainable development.' *Third World Quarterly*. June 1999; 20(3): 551-69.

Against this background, it is not surprising that the country's natural environment has been neglected. International Conventions on Biodiversity, Climate Change and Desertification have been signed, but not ratified. The following environmental threats exist:

- Desertification;
- Soil erosion resulting from population pressure and overgrazing that exacerbates periodic floods from heavy rainfall on the inland plateau;
- Siltation of surface waters as a result of the soil erosion, accompanied by growing water resource scarcity;
- Deforestation that sees forests dwindling by up to 450 square kilometers per year and has left few natural forests intact;
- Reduction in biodiversity as a result of poaching and slash-and-burn agriculture;
- Oil spills from ocean oil rigs.

In the aftermath of war, it is clear that the natural environment that has been described above will present many opportunities for sustainable economic growth. There are

opportunities for agricultural exports: coffee was exported in the past, and South African-based agribusinesses are reported to be very interested in establishing a 'food corridor' stretching across the southern part of the continent from Angola to Mozambique.

2.1.2. BOTSWANA

With a stable government that pursues orthodox economic policies, and with exports of meat, diamonds and other minerals, Botswana is a reasonably prosperous country. Indeed, the country has enjoyed the highest rate of per capita economic growth of any country in the world over the past 30 years.

With a land area half as large as South Africa's, and a population of less than two million, there has been relatively limited human impact on the natural environment. There has been little industrialization. Only two per cent of the land area has been transformed by cultivation, and this is confined to the eastern and northern margins of the country. The remainder of the country is dominated by Kalahari sands and is arid and sparsely populated.

A principal focus of the country's natural environment is its large, migratory ungulate community, accompanied by predators. This is still largely intact, due mainly to the fact that seventeen per cent of Botswana's land area has been formally set aside for conservation - a larger percentage than any other country in the world. This provides the base for ecotourism, the country's third largest economic sector after mining and stock farming.

The following environmental threats exist:

- New roads, boreholes and veterinary services are opening up expanded geographic areas to livestock farming, which may begin to encroach on wildlife habitats;
- Soil erosion, bush encroachment and depletion of woody cover are threats to the small arable land area;
- Climate change that brings reduced rainfall could prove a major threat to this country with a rainfall that now ranges from 650 mm per annum in the northeast to less than 250 mm in the southwest, and already experiences recurrent droughts;
- Much of the country is dependant on groundwater, and its quality together with an extraction rate that threatens to overtake that of replenishment poses a danger;
- Maintaining the quantity and quality of water flowing into the Okavango delta - southern Africa's largest wetland - in the north of the country is an important issue;
- Over-exploitation of land and water resources is occurring as a result of stress - especially overgrazing - imposed by cattle farming;
- Air, water, soil and solid waste pollution are becoming problems in urban areas;
- Woodlands are being depleted to provide firewood;
- Woodlands are becoming degraded and desertification is occurring.

2.1.3. LESOTHO

A small country with a small population, Lesotho's main source of income is remittances from migrant laborers working in South Africa. Commercially, this is supplemented by a tourist industry focused on skiing, while maize and livestock provide the basis for subsistence farming. An important revenue source for the country is the sale of water to South Africa from the Highlands Water Project.

Lesotho is an arid country with few natural resources apart from the water that results from melting snow on some of the highest mountains in southern Africa, and is likely to become an ever more important resource as the South African economy grows and water demand increasingly exceeds domestic sources of supply. Commercial agriculture in South Africa's dry interior is already heavily reliant on this water.

Environmental threats consist of severe soil erosion - which if allowed to continue may eventually threaten the supply of water to South Africa - and desertification. These threats have been recognized since colonial times, but have accelerated over the past few decades as a result of over-grazing, grassland burning and fuel wood collection. Invasion by alien plants is another threat.

2.1.4. MALAWI

Malawi is an economically poor country, with very little industrial development other than hydroelectric power. During the colonial era commercial plantation farming was encouraged, but now the majority of people subsist on small plots of land with few modern facilities. The country was very detrimentally affected by the civil war in Mozambique.

Ecologically, however, Malawi is a rich country with fertile soils and abundant water. Lake Malawi has abundant fish stocks, and together with the highlands has considerable tourism appeal. Environmental threats consist of:

- Deforestation resulting largely from the conversion of communally-owned miombo woodland to agricultural land;
- Land degradation;
- Poaching in protected wildlife areas;
- Siltation of spawning grounds that is threatening the fish populations of Lake Malawi;
- Conflict with wildlife; and
- Water pollution resulting from agricultural runoff, industrial wastes and sewage.

2.1.5. MOZAMBIQUE

With a history of civil war that left over 4 million citizens homeless, Mozambique is undergoing a period of rebuilding and resettlement. With a high level of illiteracy, most members of the population survive through subsistence farming in the hot and humid coastal lowlands. To the north greater altitude provides cooler conditions suitable for cattle,

but drought is a recurrent phenomenon in the hinterland. By way of natural resources, Mozambique has modest mineral resources but significant ocean fishing grounds, some of which could support intensified fishing although others have already been over-fished.

Pollution of surface and coastal waters is occurring, as is desertification. A further environmental problem is periodic severe, and possibly worsening, flooding in the central and southern provinces, which is attributable in large part to the loss of tree cover in the Limpopo River basin upstream in South Africa. Mozambique's large low-lying coastal areas could be severely affected by any rise in ocean levels that results from climate change. The coastline is also threatened by potential oil spills from the many oil tankers that pass it.

At the same time, Mozambique is rich with natural, historical and cultural beauty. Beaches line its beautiful coastline, offering reefs ideal for snorkeling and diving. Adjacent to its coastal beauty are towns with historical mosques and churches such as the Ilha de Mocambique (Mozambique Island), recently declared a World Heritage Site by UNESCO. Thus, tourism is an industry that must be developed in Mozambique, and will bring with it economic growth and poverty reduction, if managed well.

Additionally, while Mozambique's tourism development to date has catered to sun-and-sand destinations along its coast, the potential for Ecotourism is substantial. In its nature reserves, mountains, lakes and lagoons, Mozambique has exceptional flora and fauna. As part of its natural resource management planning, Mozambique can incorporate Ecotourism as a means to conserving natural resources, while at the same time providing income-generating opportunities for communities residing near these areas. In Mozambique, a well-planned effort at tourism development, with a pro-poor strategic approach, can contribute to rural development, growth in agricultural productivity, cultural and natural preservation, and greater socio-economic opportunities for the poor.

2.1.6. NAMIBIA

Namibia has large reserves of diamonds, uranium, copper and other minerals, as well as abundant offshore fisheries (although the latter's stocks of hake, horse mackerel and sardine were severely depleted by distant water fleets in the period prior to Namibia's independence in 1990). While the country is relatively wealthy, there is a large income gap between the elite and the majority. Namibia is one of the driest countries in the world and only one per cent of the land area has been transformed by cultivation.

Most of the population is situated in the north of the country, the only area that receives enough rain to support crop agriculture. This concentration is the source of one of Namibia's few environmental threats, namely land degradation and desertification. However, rangeland degradation is also encountered in the less populous areas of the country as a result of over-stocking by mobile livestock herders. Degradation is not a new phenomenon in Namibia, it has been reported since the 1950's.

Another environmental concern is water quality and quantity, with a significant dependence on groundwater. All major rivers are located on the periphery of the country

and shared with neighboring countries, making water transfer schemes problematic. Water demand management measures have been introduced.

This underlies the final major threat in Namibia, which is climate change. Decreases in rainfall, or increases in its inter-annual variability, could lead to considerable developmental problems. Already prolonged periods of drought are the primary natural hazard in the country.

2.1.7. SOUTH AFRICA

South Africa's environmental situation is different from that in other SADC countries because of the duality and relatively large size of the country's economy. A large proportion of the population lives in deep poverty in rural areas that once made up the 'homelands' of the Apartheid era. These areas show all the signs of degradation that characterizes other SADC countries, with deforestation and desertification prevalent. Water quality in these areas is usually poor and grasslands are deteriorating because they are burned annually to support cattle grazing. Invasion by alien plant species is another problem.

However, South Africa also has large cities and heavy industries that bring about typical First World environmental problems of air pollution and road traffic congestion. Water quality is not a problem in urban areas except in isolated instances, but water quantity is a concern and several large water impoundment and transfer schemes are in operation. A particular difficulty in this regard is that the main economic concentration lies in a water-scarce region, and is now heavily reliant on water imported from Lesotho. The major rivers are polluted by agricultural runoff and mining and industrial effluents. Rainfall pattern changes resulting from climate change could pose a serious threat.

One of the biggest environmental threats to South Africa is its very heavy carbon footprint. On a per capita basis, South Africa is one of the world's biggest emitters of carbon dioxide as a result of the country's heavy dependence on coal-based electricity to drive major industries like mining, minerals processing and automotive manufacture. Over the long term, this is clearly unsustainable.

South Africa is a relatively highly industrialized country, and its three main cities – Johannesburg, Cape Town and Durban – all have problems with air pollution. The 'highveld' area around Johannesburg is particularly severely impacted by the concentration of power generation and petrochemical industries there. Other concerns are the management and disposal of toxic waste, and water pollution in many river systems as a result of agricultural and mining activities.

Only 13 percent of South Africa's land area is arable, and most of it is already in use. Its declining productivity as a result of salinization and erosion is a threat, and there is also growing competition for land between agriculture, mining, urbanization, forestry and nature conservation.

South Africa has a high level of biodiversity, which serves as a major tourism attraction and increasingly is coming to be a focus of exploitation for pharmaceutical and other products. It is threatened by the loss and fragmentation of habitats and by climate change.

With a predominantly hot and arid climate, South Africa's water resources, crop agriculture and human health are also threatened by climate change.

2.1.8. SWAZILAND

This small country has substantial agricultural and mineral resources. Its main export product is sugar. While Swaziland has abundant natural resources, the environmental problems of the SADC region are particularly pronounced here. Deforestation is a major problem, with large indigenous timber areas having been cleared for fuelwood, mineral development, agriculture and urban development. This has led to land degradation, severe soil erosion that appears to be exacerbated by the country's soil structures, and the loss of wildlife habitat. Wildlife populations have been further reduced by excessive hunting, and overgrazing is another environmental problem.

2.1.9. TANZANIA

Whether or not HIPC will assist Tanzania in maintaining a sustainable debt, it is unlikely that the debt resources provided will have a visible impact on poverty. Therefore, there is also likely to be little impact on the environment. It has a mix of densely populated cities, areas with high agricultural productivity and large unpopulated areas. Most of the country is at fairly high altitude and rainfall is limited. Tourism based on wildlife and dramatic scenery is a major industry but wildlife resources are severely impacted upon.

Many members of the population depend for their livelihood on subsistence agriculture, having drifted back to the land after government efforts to concentrate them in villages failed. Slash-and-burn agricultural practices and overgrazing have brought with them the common southern African problems of deforestation, land degradation, declining soil fertility, desertification and siltation of surface waters. Poaching is rampant in protected wildlife areas. Coastal erosion accelerated by illegal sand mining is a severe albeit localized problem.

Wind energy is reported to be a viable alternative supplement to the existing hydroelectric power stations that encounter problems of drought during the dry season. Bamboo is a potential export product.

2.1.10. ZAMBIA

The Zambian economy is dominated by copper, which accounts for over eighty per cent of exports. The economy has suffered in the past two decades from a fall in world copper prices, the imposition of international sanctions against Zimbabwe and the civil wars in Angola and Mozambique.

While the climate can support many kinds of crops, high transport costs limit agricultural exports other than tobacco. Most farming is consequently undertaken only for subsistence or for food crops that are sold to the towns, especially the heavily urbanized copper belt region around Ndola. Recurrent drought is another serious obstacle to commercial farming.

In the copper belt, mineral extraction and refining has resulted in air pollution and acid rain; only recently have steps been taken to attempt to remedy these problems. Water pollution also results from these activities.

Zambia has significant wildlife resources that have been the focus of community-based management strategies. As in other SADC countries, it has been recognized that the so-called 'fences-and-fines' or 'fortress' approach of excluding local communities from protected areas has not worked well. However, the community-based conservation that has replaced it is now also being viewed as a failure in many instances, and biodiversity losses continue. In Zambia in particular, poaching continues to be a serious threat.

Another environmental threat is deforestation in the Miombo woodlands of northern Zambia. Deforestation and siltation of small dams as a result of soil erosion are further problems.

2.1.11. ZIMBABWE

International sanctions followed by political mismanagement have seriously undermined Zimbabwe's once strong economy. Inherently, however, the country has both agricultural and industrial potential. After South Africa, it is the second most industrialized country in SADC. A relatively large proportion of the land (13 per cent including permanent pastures) has been transformed by cultivation, and crop and livestock farming contribute over twenty per cent of the country's GDP.

Zimbabwe's CAMPFIRE program of communal wildlife management is well known and widely regarded as successful. However, the current development strategies of many households in CAMPFIRE areas incompatible with wildlife: population in-migration, extension of cropping and increased livestock numbers.

Threats to the environment include:

- Growing air pollution in the larger cities such as Harare;
- Pressures on land resources, including national parks and reserves, from a population with limited economic alternatives and livestock that are concentrated on marginal land;
- Land degradation, deforestation and soil erosion which is particularly threatening in rural areas where people have traditionally derived around forty per cent of their total incomes from the indigenous environment;
- Water scarcity in most parts of the country, which has little groundwater and most of its surface water concentrated in the Zambezi River on its northern border;
- Climate change.

2.2. Southern Africa Region Environmental Threats and Opportunities

In this section we consider the environmental threats and opportunities that are common to the Southern African region as a whole. The section covers issues related to biodiversity, tropical forests, freshwater and marine resources, watersheds, conflict, health, food security and institutional context.

2.2.1. BIODIVERSITY RESOURCES: DISTRIBUTION AND EXTENT OF BIODIVERSITY RESOURCES

Biodiversity or biological diversity refers to the variety of life or variety and variability among living organisms and the ecological systems that they are part of. Southern Africa is very diverse in all aspects of biodiversity (i.e. genetic variability, species diversity and ecosystem diversity). The subregion covers about 2% of the world's land area but supports some 10% of its plant species. Biodiversity is unevenly distributed across the sub-continent (see Appendix A, Table 1: Summary of Biodiversity Ranking of Countries in Southern Africa) with east-west and north-south gradients in primary productivity probably an important determinant of compositional and structural differences across the subcontinent.

Biodiversity is the very foundation of life for the majority of rural people in the sub-region. Their food security is based on a diversity of crops, domestic animals, forests and wildlife resources. The richness of biodiversity ensures present and future stability of food supply as well as continuing adaptation of natural ecosystems to changing climatic conditions. The loss of biodiversity threatens the livelihoods of local communities as biodiversity provides shelter, food, fiber, medicines and other products that ensure their survival.

The benefits and importance of biodiversity to all societies living in southern Africa are enormous. A large proportion of southern Africa's population is directly dependent upon biological resources for subsistence purposes. These include the gathering and harvesting of plants for food, fruits and seeds, vegetables, tubers, medicines, fuel, mushrooms, honey and fodder. The use of biological resources, therefore, provides an important buffer against poverty as well as opportunities for self-employment in the informal sector. If such resources are not adequately conserved and managed, we run the risk of losing their substantial economic benefits.

2.2.1.a. Conservation Issues and Protected Areas

By 1998, most nations across southern and eastern Africa had ratified the 1992 Convention on Biological Diversity. Progress has been made at regional level in terms of establishing National Biodiversity Strategies and Action Plans (NBSAPs). For instance, Angola has established a Biodiversity National Steering Committee with a plan on plant conservation and enforcement of local legislation. Botswana has undertaken community level biodiversity awareness with support from the Global Environment Facility (GEF). Mozambique is in the process of revising the National Biodiversity Strategy and Action

Plan for the conservation of the biological diversity that would include issues of poverty alleviation. Namibia and Zambia have completed the National Biodiversity Strategy and Action Plans.

At the core of these biodiversity strategies is the concept of maintaining protected areas. The network of protected areas across the southern African landscape plays an important role in conservation but biodiversity protection differs between countries, not only in terms of the number of protected areas, but also in the total area they cover (see Appendix A, Figure 1, Reserve Sizes, and Figure 2, Protected Areas in Africa) and the level of efficiency at which these protected areas are capturing and protecting biodiversity.

Historically these areas excluded or restricted people of local communities from using the natural resources within them. This kind of protectionism is closely associated with colonialism and often has led to conflict and resentment. In many circles these so-called “top-down” approaches to maintain biodiversity are therefore no longer considered appropriate. Throughout most of southern Africa conservation is no longer only a biological issue. It also rests on sociological, financial, economical and political forces. Over the past few decades several conservation projects were directed at achieving both the goals of biodiversity conservation and human community upliftment. Often the focus is on sustainable use of resources rather than that of setting aside resources for future use. However, such sustainable use is not feasible, as natural resources cannot meet the needs of surrounding communities (Scholte, 2003). Conservation based community development thus is completely reliant on external resources through donations.

2.2.1.b. Threats to Biodiversity: Inappropriate Land Use (Agricultural) Practices

Much of the landscape of southern Africa has been transformed by a variety of land-use practices. Figures for the whole of southern Africa are not available, but in South Africa itself ~18% of the land surface has been either urbanised, mined, cultivated, afforested or otherwise degraded (Fairbanks *et al.*, 2000). A large part of the rest is extensive rangeland that has also been changed to varying extent by livestock farming practices. These practices have fragmented natural landscapes into sub-viable ecological units through artificial fencing, either to manage land ownership (typical in South Africa and Namibia) or to control the movement of livestock and game (typical in Botswana). Land ownership across large portions of South Africa, Namibia and Zimbabwe led to landscape degradation through large scale commercial growing of crops or keeping of cattle, sheep and goats. Communal lands across the sub-continent have typically been degraded through overgrazing that often gives rise to bush encroachment and the loss of soils and reduced ecosystem functions.

Protected areas are dotted across a variety of landscapes, often surrounded by people living in poverty and seldom provide opportunity for scale dependent ecological processes to maintain viable wildlife populations. In general biodiversity resources in all countries across the sub-continent seem to suffer from inappropriate land use practices, either due to their colonial history or due to the poor planning of land use practices.

2.2.1.c. Population Growth and Uncontrolled Migration

Human populations throughout southern Africa are increasing in numbers (Cumming, 1999). The average population growth rate of 3% per year is higher than estimated economic growth rate. Growth rates are presently affected by the HIV/AIDS pandemic but are still positive in an environment where poverty is on the increase. The predicted declines in economic growth in response to disease-related declines in population growth rates will further constrain budgets for biodiversity conservation. Reduced economic growth will also result in increased dependence on natural resources and their consequent erosion.

Uncontrolled immigration to the regions surrounding protected areas across the sub-continent artificially increases human populations (see Scholte, 2003). These populations are increasing burgeoning conservation efforts through poaching, uncontrolled land use and the extraction of resources as non-sustainable economic incentives.

2.2.1.d. Climate Change

Climate change, and its effect on the spatial distribution of organisms and ecosystems is a reality (Hughes, 2000; Parmesan & Yohe, 2003; Root *et al.*, 2003). In the last 100 years, global surface temperatures have increased by 0.4°C - 0.8°C, which is greater than any other temperature increase in the past 1000 years (IPCC, 2001). Climate change will not be uniform throughout the world, but will instead show high variability over space and time (Walther *et al.*, 2001). The effect of climate change is exacerbated by factors such as the conversion of forest to agriculture (Defries *et al.*, 2002), which larger in the tropics of Africa than in the rest of the sub region (Gaston *et al.*, 1998). Although one of the major results of global warming appears to be increased variability of natural climatic phenomena, and an associated increased potential for climatic disasters (Winterbottom, 1997), distribution and range shifts of organisms are probably the most serious and easily observed consequences of climate change for biological diversity. Climate change is a global phenomenon, but its effects are most apparent at the local scale on the level of the population (McCarty, 2001). Not only will the ranges of particular animals in Africa change with an increase in ambient temperature (Dunbar, 1998), but also the extent and distribution of montane cloud forests may decrease (Still *et al.*, 1999). Essentially species are faced with two options in the face of increasing climate change; they can either adapt or become locally and even globally extinct.

In order to determine the potential effects that global climate change will have on many local species assemblages, we need to find evidence using modeling and empirical observations. Bioclimatic modeling remains one of the only methods available to predict global or regional responses of species to a changing climate. Various computer models have been produced to simulate what the possible effects of climate change, associated with a doubling of pre-industrial global carbon dioxide concentrations, could have on the southern African biota. The most probable of these models predict that southern Africa will experience increased local temperatures which will result in range shifts for most animal and bird species from west to east (Erasmus *et al.* 2002). Modeling suggests that the majority of bird, mammal, reptile and invertebrate species will experience range

contractions as the local and regional temperatures increase and the annual precipitation decreases. Some species adapted to drier, warmer local climates may show range expansion, but they are the minority (Erasmus *et al.* 2002).

In South Africa most of the range shifts are predicted to occur in an easterly direction, towards the most populous and transformed parts of the country, which will exaggerate the effects of climate change and lead to many more extinctions and range contractions than would otherwise occur (van Jaarsveld & Chown, 2001). Range shifts and changes in community composition, coupled with differences in species' abilities to respond to climate zone changes, will in many cases result in dramatic changes in the structure and function of communities.

2.2.1.e. Invasive Alien Plants and Animals

Alien invasive species of plants and animals are causing massive disturbance in natural ecosystems across Africa. They are posing a threat to the indigenous biodiversity of all member states of the Southern African Development Community (SADC)¹. There is a need for a SADC database on alien species with the extension of the Southern African Plant Invaders Atlas (SAPIA) project to the region.

In Southern Africa, the introduction of alien tree species, originally for commercial or horticultural reasons, is of greatest concern. The Catalogue of Problem Plants in southern Africa (Wells *et al.*, 1986) lists 789 species, some of which, like *Acacia saligna* and *Hakea sericea*, have dominated areas to the extent that natural vegetation has been almost completely lost. Others, for example pine and eucalyptus trees, present a threat to water availability because they use greater amounts of water than the natural vegetation, and therefore reduce the amount of run-off reaching streams and rivers. Other species form dense stands that reduce the amount of light reaching the understorey, physically strangle native species and inhibit regeneration of native seeds. These impacts reduce the diversity and cover of indigenous plant species, and thus alter functioning of the ecosystem.

In South Africa, where the problem of alien invasive species has been well quantified and documented, about 180 species of trees and shrubs have invaded, covering 10 million hectares (8 per cent of the land area) (Versveld *et al.*, 1998). The plant diversity of the Cape Floral Region is particularly threatened by invasive species. Here an estimated 33 of 70 threatened plant species are potential extinction victims of invasions of alien woody plants (Hall *et al.*, 1980).

The water hyacinth (*Eichornia crassipes*) is a problematic invasive plant in southern Africa, forming dense mats that block water channels, disrupting flow patterns, reducing light and nutrients reaching below the surface of the water, and thus creating an undesirable habitat for native plants and animals. Decaying mats of the weed generate unpleasant odors and lead to eutrophication of the water body. Efforts to control exotic invasive plant species in

¹ "Alien species 'cost Africa billions'", BBC. Available at: <http://forests.org/articles/reader.asp?linkid=19930>

some parts of the sub-region are commendable but here the prevention of further spread or further introductions is probably more effective than extermination.

2.2.1.f. Lack of Information

There is a marked lack of information available on the diversity of most invertebrates, algae, bacteria and fungi in Southern Africa, including on their genetic diversity. Thus many species in the sub-region, as elsewhere, may be threatened or become extinct before they can be named and described.

Lack of knowledge of biodiversity issues has been compounded by ignorance. As a result many protected areas were set aside without accurate assessment of the biological richness within their boundaries. Thus some areas that have little significance in terms of biodiversity are protected while many others with significant biodiversity lack protection. The lack of comprehensive knowledge of biodiversity in southern Africa also contributes to growing discontent about unauthorized access to biodiversity and lack of reciprocity in benefit sharing, mainly on the part of the rich developed countries. For example, while acknowledging that developing drugs is costly, it is also important to attain goals of wealth creation that will provide substantial benefit to those who conserve biodiversity through a culture of bio-partnership, rather than indulging in bio-piracy.

2.2.1.g. Foreign Debt Servicing

Structural Adjustment Programs (SAPs) refer to a set of policies required of developing countries by international financial institutions such as the IMF and the World Bank to receive loans or restructure current loan repayments (Hanks, 2003). The policy requirements are designed to influence the market-orientation of the economy and generate foreign exchange through a positive trade balance. The policies may include a devaluation of the currency; liberalization of trade and capital flows, reductions in subsidies and price setting, privatization, and cuts in government budgets and programs. The environmental effects of structural adjustment vary from country to country depending on the specific components of the reform package, the structure of the economy, and the implementation process. However, increases in poverty, greater production incentives, and the loss of government regulatory capacity aggravate patterns of poor resource use.

A priority of most SAPs is the reduction in government spending. Non-essential services are the first targets, with environmental departments seeing some of the largest budgetary cuts and lay-offs. Such cuts reduce capacity to manage existing conservation areas and minimise a government's ability to prosecute environmental offenders and address environmental problems.

In attempts to enhance competitiveness, local industries join the government in cutting staff, thereby increasing unemployment and poverty. The strong correlation between poverty and environmental degradation is evidenced in increased deforestation and land degradation through subsistence farming, over-hunting, and the unmanaged extraction of non-renewable resources.

To meet a SAP's ambitious targets for currency reserves and a positive trade balance, extractive and agricultural economies often turn to their natural resource base to generate hard currency. Access to international markets and capital creates further production incentives. These countries often over-exploit their resources through unsustainable forestry, mining, agricultural practices, and unrestrained tourism, generating pollution and increasing environmental destruction. In this scenario of increased pressure on a country's natural capital, the government, forced to reduce government spending within the SAP, now lacks the resources to enforce environmental regulations and manage its conservation areas. In the context of an SAP, the environment is not seen as a critical system.

2.2.2. TROPICAL FORESTS – REGIONAL DISTRIBUTION AND FOREST RESOURCES

Forests² are distributed in a wide arc across the northern and eastern parts of southern Africa (see Appendix A, Figure 3, Rainfall and Vegetation). Their distribution in the region, which was probably much more extensive during the Holocene altithermal (Eeley *et al.*, 1999), roughly coincides with a mean annual rainfall of >400 mm (FAO, 2001). Not surprisingly, countries in the region differ markedly in both the area under forest (see Appendix A, Table 2) and forest type (Table 3). Ecologically, most of the region's forests are tropical moist deciduous (most often miombo woodlands), with some tropical rainforest elements in the northern parts of Zambia (FAO, 2001). Towards the southern parts of the region forests are limited to the coastal plains and escarpments and the dominant types consist of subtropical humid and dry forests, with a minor temperate montane forest component (FAO, 2001). This ecological zonation is reflected in the country forest profiles (Tables 2 and 3). Angola has by far the largest area under forest, followed by Mozambique, Zambia and Tanzania. South Africa, Namibia and Lesotho, with less than 10% of their area covered by forests, are all classified as low forest cover countries by the FAO (2003). Malawi has the highest biomass per ha (biomass density) in forests, followed by Swaziland and Zambia. Biomass density in the other countries is relatively low, reflecting their more open structure.

Commercial logging of natural forests occurs on a much smaller scale than in the true tropics (FAO, 2003), although we state this with some hesitancy because the FAO includes planted forests in their estimate. Timber production from natural forests occurs only in Angola, Mozambique and Zambia (FAO, 2001). Natural timber has largely been eliminated from Zimbabwe and Malawi (FAO, 2001). Ecological conditions in the rest of the region do not favor natural timber production, but South Africa, Malawi, Swaziland, and Lesotho all have extensive commercial planting programs (Table 2). More than two thirds of total log consumption in Tanzania is commercially planted softwood from 18 national plantations,³

² Here we use the definition of the FAO (2000). To develop a standard definition of forests, FAO adapted the threshold of a 10% crown cover to describe the minimum canopy density where naturally occurring formations of trees exist as communities. The scientific basis for the 10% limit, which is a subject of ongoing debate, was established in 1973 in UNESCO's landmark study on worldwide vegetation classifications.

³ See <http://www.sadcreview.com>

but total planted forest area is still small at less than 0.5% of total forest area (Table 2). Namibia and Botswana, being arid countries, have relatively low forest cover and also very small planting programs (FAO, 2003).

In all of the countries in the region, forests are still a reservoir of basic goods and services. Indeed, fuel wood is the major consumptive use of forest products in Africa, dwarfing commercial logging (FAO, 2003), although forests are also a source of income from nonwood forest products (bushmeat, rattans and fibre, edible and medicinal plants, honey, tannins, gum arabic, etc.) and tourism (CBD, 2001; FAO, 2001). Direct extraction and consumption of forest products (e.g., clearing for agriculture, hunting, and fuel wood) occur on a scale that is large enough to make them arguably the greatest threats to the ecological integrity of forests in the region.⁴ Forests are also still of direct cultural significance throughout the region. Many of the medicinal plants used by Africans are from forests⁵ and many forest plant and animal species play a role in traditional ceremonies⁶. There is thus still a very direct link between people and forest resources across the region.

2.2.2.a. Conservation issues and protected area status

Collectively, forests are the repository of a large part of the world's biological diversity and thus deserve protection. The extent of protection of forests differs vastly across the southern African region. Five of the countries (South Africa, Angola, Mozambique, Namibia and Swaziland) formally protect less than 10% of their forests, and only three (Malawi, Botswana and Zambia) have more than 20% in formal protection. However, an evaluation of protection status is confounded by different definitions of forest. For instance, according to the FAO (2001), about a quarter of the forests in Tanzania are in national parks, game reserves and forest reserves. On the other hand, SADC, using a different definition, estimates that only about 4% of Tanzania's forests (mainly savannah and intermediate woodland) are protected⁷. Using a standard such as IUCN protection categories, Tanzania is estimated to have 14% of its forests in some form of formal protection (Figure 2: Protected Forest Areas in Africa).

Application of protection laws is poor across the region, but especially so in Angola where these laws for all intents and purposes do not exist (FAO, 2003). Laws and policies have also not kept pace with strong moves, particularly in South Africa⁸, and Zimbabwe, to give control of natural resources to local communities (Grundy & Cocks, 2002; Tyynelä, 2002). Although ownership and management authority of forests is fragmented in South Africa⁹, most of the countries in the region have no more than two or three agencies and government institutions that control access to forest resources. Recent moves to

⁴ "Bushmeat Crisis - Causes, Consequences and Controls", Central African Regional Program For The Environment, Congo Basin Information series; available at:

http://www.bsponline.org/bsp/publications/africa/127/congo_23.html

⁵ "Plantgatherers threaten forests" SAPA. Available at: <http://forests.org/articles/reader.asp?linkid=21229>

⁶ "Bushmeat Crisis - Causes, Consequences and Controls", Central African Regional Program For The Environment, Congo Basin Information series; available at:

http://www.bsponline.org/bsp/publications/africa/127/congo_23.html

⁷ <http://www.sadcreview.com>

⁸ http://www.polity.org.za/html/govdocs/white_papers/forestry.html

⁹ http://www.polity.org.za/html/govdocs/white_papers/forestry.html

decentralise public administration of forests in Zimbabwe and Tanzania, for instance, hold both risks and benefits for the wise management of forest resources (Tyynelä, 2002; FAO, 2003).

2.2.2.b. Threats to Tropical Forests

Threats to forests are mostly the same as the threats to biodiversity in general. In this section we therefore deal only with some threats that are more specific to forests. The propensity for humans to occupy areas with high net primary productivity (Balmford *et al.*, 2001; but see Barnes & Lahm, 1997), means that forests will be proportionately under more pressure, regardless of the country. The main threats to forests in the region reflect this situation. Most forest loss in the tropical areas is due to clearing for agriculture and fuel wood production, but in the drier areas degradation due to overgrazing is more important. Miombo woodland, the dominant forest cover in Zambia and Zimbabwe, is threatened mostly by clearing for agriculture¹⁰. This situation is apparently worsened by an increase in human populations in these areas and is severest in the drier miombo of Zimbabwe. This underlines the strong link that exists between agriculture and forests globally (FAO, 2003). The net change in forest cover across the region is negative (Table 2), although the total rate of loss is less than in the true tropics (CBD, 2001; FAO, 2003). Zambia and Malawi have the largest rates of forest loss per year, but only Swaziland has had a net gain in forest cover (Table 2), most likely as a result of commercial plantations. Most African forests have lost more than 50% of their original¹¹ cover (IUCN, 2003) and the overall average rate of loss in the African tropics has been estimated to be about 0.5%¹².

Although sustainable use of forest products could contribute to conserving biological diversity, the net loss of forests in the region is evidence that in its current form(s), forest utilisation is not achieving this. The thesis that African societies, through uniquely African cultural practices, have caused widespread deforestation has quite rightly been criticised (Beinart, 2002: 221), but the evidence on the whole points to an unsustainable situation. Hunting is often illicit and commercially motivated (see for instance De Villiers & White, 2000) and can play havoc with forest mammal populations, which never occur at high densities (De Villiers & White, 2002; FAO, 2003). Hunting for wildlife is considered to be a greater immediate threat to biodiversity conservation than is deforestation¹³. The age-old practice of shifting cultivation has more or less become unsustainable wherever it is practiced in the region, due to increased human populations (Cumming, 1999) and may be one of the major reasons for the loss of forest cover in the wetter regions.

¹⁰ http://www.bsponline.org/bsp/publications/africa/issues_2/title.htm

¹¹ Original forest cover refers to an estimate of the extent of closed canopy forest in existence 8,000 years ago, assuming current climate conditions.

¹² "Deforestation in Central Africa Significance and Scale of the Deforestation", Central African Regional Program For The Environment, Congo Basin Information series; available at:

http://www.bsponline.org/bsp/publications/africa/127/congo_06.html

¹³ "Bushmeat Crisis - Causes, Consequences and Controls", Central African Regional Program For The Environment, Congo Basin Information series; available at:

http://www.bsponline.org/bsp/publications/africa/127/congo_23.html

Fragmentation is a major threat to the ecological integrity of forests (FAO, 2003). Fragmentation causes isolation of many plant and animal populations in (often) too small areas for ecological processes to ensure their persistence. Its impact is usually disproportionate to its scale, because edge effects multiply the net area of impact. Most deforestation occurs at the edge between woodlands and forests¹⁴, most likely because access is simply easier here. Much of the remaining forests in the southern African region have been fragmented to a greater or lesser extent, but some relatively large and contiguous patches remain in Zambia and Botswana (FAO, 2001). Fragmentation rates appear to have been stabilised in South Africa¹⁵, but is increasing in Mozambique, Zambia, Malawi and Zimbabwe (Cumming, 1999).

More recently, the clearing of coastal dune forests for mining in South Africa has become a public conservation issue, one that has not been completely resolved. In the short to medium term, mining will no doubt put further pressure on dune forests in South Africa and Mozambique, where vast mineral leases have been awarded, although forest restoration technology promises some relief (van Aarde *et al.*, 1996; Wassenaar & van Aarde, unpublished manuscript).

2.2.3. FRESHWATER AND MARINE RESOURCES

Freshwater and marine resources in Africa are important for reasons of economic growth and nutrition, and well as range of ecosystem services, including biodiversity conservation. The ecological and economic productivity of these resources are threatened by several factors –including policy and planning weakness, exotic species introduction, overfishing, deforestation, pollution, agricultural and aquacultural conversion, water diversion, and global climate change.

2.2.3.a. Freshwater Resources

Water is unequally distributed across the southern African region (IUCN, 2003). Water is relatively abundant in the north and east of the region, but decreases to the south and west (Turton, 2001). However, supply is extremely variable between seasons and across years (Rangeley *et al.*, 1994; Turton, 2001). Per capita water availability is high in the Zambezi, Congo, Cunene and Cuanza basins, but relatively low in the Orange and Rufiji (IUCN, 2003). These factors have led to high storage levels and inter-basin transfers of water to meet the needs of human populations, especially in South Africa, that have settled in areas with low water availability (Turton, 2001). Coupled to this is the generally high evaporative demand in the southern and western parts of the region, to such an extent that evaporation often exceeds precipitation rates (Turton, 2001). Some parts of the region, especially in South Africa, thus often experience water scarcity (IUCN, 2003), a situation that is likely to worsen with high human population growth rates (Turton, 2001).

¹⁴ "Deforestation in Central Africa Significance and Scale of the Deforestation", Central African Regional Program For The Environment, Congo Basin Information series; available at:

http://www.bsponline.org/bsp/publications/africa/127/congo_06.html

¹⁵ http://www.polity.org.za/html/govdocs/white_papers/forestry.html

Water, or the lack thereof, is thus a fundamental environmental determinant in southern Africa. It is a key factor in the cause and alleviation of poverty (Turton, 2001), in disease transmission (for instance cholera¹⁶), in environmental damage caused by flooding, and in large-scale and long-term patterns of ecological change. In South Africa, ~80% of urban and ~50% of rural people have direct access to clean freshwater and the situation is much the same in Swaziland¹⁷. Such low levels of access, together with relatively recent moves to commodify access to water for all people (Bond, 2002), have indirect environmental implications because it leads to poor sanitation and potential for disease outbreaks. Water, poverty and environmental degradation are intricately related. Water availability and quality will be affected by climate changes inducing rainfall and drought extremes.

Problems associated with water storage gave rise to the construction of a large number of expensive dams. The top twenty countries in the world by number of large dams contain two southern African Development Community (SADC) countries – South Africa (position 11) and Zimbabwe (position 20) (WCD, 2000). This becomes relevant when one considers that the Southern African region is also characterised by a high level of evaporative demand, sometimes in the order of 2,250mm to 3,000mm per year. In many cases the evaporative losses exceed precipitation rates in arid and semi-arid regions, which is the very reason for the aridity in the first place. For example, evaporative losses from Lake Kariba account for some 20% to 25% of the annual flow of the Zambezi River (Mac Donald, 1990). Evaporative losses from the Vaal Dam exceed precipitation in the upper Vaal catchment every month of the year (Davies *et al.*, 1993, cited by Turton, 2001). Evaporative losses account for approximately 25% of the average inflow to Pequenos Limbombos Dam in Mozambique and evaporative losses from the Omatako Canal in Namibia account for a staggering 70% of the water carried by the scheme at that point (Davies *et al.* 1993, cited by Turton, 2001).

Another fundamental driver of water scarcity in southern Africa is population growth. In many SADC countries the population growth has been in excess of 2.5 times since 1961, with some countries showing a staggering 3.2-fold growth over a 40-year period. This places heavy demands on governments and local authorities to deliver potable drinking water (Turton, 2001).

The Southern African population generally tends to live in areas where there is a limited availability of water. The transfers of water along channels and pipelines are the norm and the spatial linkage between the areas where water is available and the areas where water is needed. The high dependency on water transfers is best illustrated by the South African case where 7 of the 9 provinces generate in excess of 60% of their Gross Geographic Product (GGP) directly from water that is provided by means of inter-basin transfers (Basson *et al.*, 1995, cited by Turton, 2001). This makes water transfer a strategic issue for the more economically active countries in SADC (Turton, 2001).

¹⁶ "South Africa: Metered to death: How a water experiment caused riots and a cholera epidemic"; available at: <http://forests.org/articles/reader.asp?linkid=19916>

¹⁷ http://www.iwrms.uni-jena.de/watres_sa.html

A key implication is that water scarcity is a relative thing. For those who can afford to pay for water, scarcity is less apparent than for the poor. Water scarcity in the region will continue to exacerbate poverty, but more importantly, may give rise to political conflict. This happened fairly recently in southern Africa, when Namibia experienced a period of acute water scarcity due to a particularly severe drought. Their plans to tap water from the Okavango led to sharp protests from Botswana, who is critically dependent on reliable water supply to the Okavango wetlands. The situation was only resolved when enough rain fell to relieve Namibia's crisis (Winterbottom, 1997). These types of situations are likely to increase in the future.

2.2.3.b. Coastal and Marine Resources

Africa's coastal and marine ecosystems are under extreme pressure from pollution from both land based and marine based sources. Among these are uncontrolled discharges of industrial waste and sewage from coastal settlements; refuse blown or washed out to sea from formal or informal rubbish dumps; general and toxic wastes deliberately dumped at sea; and oil spills and leaks. Effluents from fish processing plants and industries located in the coastal zone are frequently discharged into the sea or surrounding watercourses or wetlands, from where contaminants are washed out to sea. Residues of fertilizers are also washed into the rivers, and contribute to eutrophication of coastal waters, and the development of algae blooms and red toxic tides.

The impacts of coastal and marine pollution are widespread and affect natural habitats, human communities and economic activities. Contamination of shellfish by the red tide can lead to severe economic losses. Pollution of coastal waters by sewage can expose local communities and tourists to cholera, typhoid, and hepatitis. At seas, solid waste can be mistaken for food and eaten by dolphins, turtles and sea birds. These creatures are also at risk for entanglement and poisoning.

Overexploitation and decline of marine fish stocks: Living marine resources are one of Namibia's richest assets. The bottom line regarding threats and trends identified in 1996 is that good fisheries management has been successful in stabilizing the catch of some of the important species. Or some species, whoever, stock remains depleted and the trends are not hopeful. Significant threats remain to be addressed.

A positive development aimed at addressing threats to living marine resources in the Benguela Current Large Marine Ecosystem Programme (BCLME). This program is developing increased regional cooperation between Namibia, Angola and South Africa in research on, and management of, fish and other marine resources within the Benguela Current marine ecosystem. The aim of the BCLME program is to understand and adapt to the state of the ecosystem, and to manage its living resources on an integrated and sustainable basis. An interim commission was established between the three countries to strengthen regional cooperation and to implement the BCLME Strategic Action Programme (Africa Environment Outlook, 2003)

2.2.4. WATERSHED PERSPECTIVE

The region comprises seven major¹⁸ watershed basins (see Appendix A, Figure 4, Watershed Basins). The Congo basin drains only the northern parts of Zambia and Angola and therefore plays a minor role in the environmental issues around water in the region. Central management organizations exist only for the Zambezi and the Orange (Rangeley *et al.*, 1994); over the rest of the region water management is highly fragmented and in some places non-existent (IUCN, 2003). The major rivers of Africa share several characteristics that influence their environment (Rangeley *et al.*, 1994). First, the often-dry downstream riparian eco- and agricultural systems are heavily dependent on management actions in the upper reaches. Second, and related to this, the seasonal and annual flows are subject to wide fluctuations, due to the generally wide seasonal and annual variation in rainfall. This has necessitated the construction of large reservoirs (dams >15m high) on at least six of the major rivers in the region (McCully, 1996; Rangeley *et al.*, 1996). Indeed, both South Africa and Zimbabwe are in the top twenty list of countries in the world by number of dams (Turton, 2001). Third, water quality in general is higher than for comparative basins in the rest of the world (Rangeley *et al.*, 1994), although water in the region's industrialised basins is becoming more polluted (Hohls *et al.*, 2002).

Environmental issues differ greatly among the seven watersheds. The Orange and Limpopo both drain industrialised areas; consequently pollution and water quality are more important issues here (Hohls *et al.*, 2002). The Orange, Limpopo and Zambezi are the most densely populated watersheds, with an average of 10, 32 and 18 people per km² respectively. This is also reflected in the much higher number of large reservoirs on these three rivers compared to the other four rivers in the region (see Appendix B, Watersheds of Africa). Both these basins have lost almost all of their original forest cover (IUCN, 2003), but deforestation rates and degradation levels are perhaps higher in the Zambezi (Sharma *et al.*, 1996). Most of the land in the Orange basin has been converted to agriculture (Cumming, 1999; FAO, 2003), but the Okavango basin is still largely intact with all of its original forest cover present and more than 10% of its area protected (Appendix A; IUCN, 2003). The Cunene and Cuanza are both still relatively intact, but both have less than 5% of their area protected, as do the Orange and Rufiji (IUCN, 2003).

2.2.5. CONFLICT AND THE ENVIRONMENT

Most southern African countries experienced internal strife and armed conflict, either as part of the struggle for liberty or in response to decolonisation. Armed conflict has had severe implications for the natural resource base of such countries (see Kalpers, 2001). Armed conflict gives rise to the loss and degradation of ecosystems, biodiversity and food security. Entire communities of plants and animals may become impoverished, or vanish. Intensive poaching and the destruction of natural habitats may result in the decline, or even the disappearance, of entire populations of animals. Many protected areas in Africa were

¹⁸ Several other, minor watersheds of rivers that drain the coastal regions are too small to deal with in this report.

established for the purpose of protecting certain animal or plant species deemed vulnerable or endangered. Imbalances caused by armed conflict may easily lead to irreversible decline and a major loss of biological diversity.

Conservation, which is often weak to begin with on the African continent, is faced with an enormous array of disastrous consequences during armed conflict. Loss of human life, loss of equipment and infrastructure, loss of financial resources, and loss of security are all factors that contribute to the weakening of government agencies and ministries responsible for conservation (see Kalpers, 2001). Tourism, particularly international tourism, is extremely sensitive to armed conflict and the loss of such revenue could further degrade conservation initiatives to protect biodiversity within the region.

Armed conflict induced destabilization of the socio-economic environment of rural areas tend to change perceptions of a protected area. This is a key factor in intensifying the risks that weigh upon the protected area. Local communities then tend to focus on their survival and typically increase the pressure on natural resources, including those that fall within protected areas. Protected areas may become a refuge or corridor for various armed groups. This precarious situation may spark a certain hostility toward such protected areas (see Kalpers, 2001).

War conceivably limits access to agricultural resources and to normal commerce. Such circumstances force populations to live off local resources available in natural habitats. Protected areas then become lifeboats for populations placed in a precarious situation. This further increases human pressure on natural resources, but it may also be viewed in a positive light because it utilizes natural resources to save human life. In Angola, for example, many rural regions were able to escape famine by subsisting on local wildlife. Bush meat reportedly satisfied about 70 percent of the protein requirements of populations in these regions at the height of the war. Anstey (1993) believes there are long-term benefits to these lifeboat situations as local people come to appreciate the true value of natural resources. However, it is really a matter of scale. In some regions of Africa, the availability of automatic weapons due to armed conflict has led to a huge eruption of poaching of megaherbivores such as rhinoceros and elephant by armed and organized groups (Martin & Hillman Smith, 1999).

The best information for the sub-region that we could lay our hands on came in the form of a lengthy report (Hatton *et al.*, 2001) on the consequences of armed conflict for biodiversity in Mozambique. We have no reason to consider this pattern of destruction as unique and considered it best to include a summary of the Mozambique experience as an indicator of what the consequences of armed struggles would be for any of the countries in the sub-region. We do appreciate that the natural resource base for these countries differs and that some of them support either regions or species of greater international conservation significance than others. In spite of that the destructive consequences of civil and international strife for natural resources is real and can not be valued on the species or regions that will be effected.

In Mozambique some 50% of rural people were displaced during the 12-year civil war that followed on the war of independence. This displacement reduced man-made disturbances on many of the rural areas and in the absence of a slash-and-burn based agriculture much of the natural vegetation re-established on deserted farmlands. However, wildlife resources, especially the large mammals, both inside and outside protected areas were totally destroyed. Infrastructures within these protected areas were also destroyed. The destruction of natural resources continued after the war as infrastructures and staff to take care of resource conservation were no longer in place.

In Mozambique commendable post-war rehabilitation programmes directed at the conservation of natural resources, supported through international funding, is presently underway. Some of these include the development of community-based natural resource management programmes that are being hampered by the breakdown of traditional authorities. Here the ongoing development of national laws and infrastructures should benefit natural resource management. However, the lack of financial and manpower resources hamper many of these development programmes.

In Mozambique displaced people have established in and around major cities and their high densities there are giving rise to the total destruction of natural resources. Armed struggle also gave rise to refugees fleeing into surrounding countries. As a consequence of limited infrastructures in such countries this form of immigration them also give rise to severe impacts on the natural resource based in neighbouring countries. As a consequence Mozambique refugees locally destroyed natural resources in South Africa, Swaziland, Zimbabwe, Malawi and Zambia. This also is happening around refugee camps set up for Angolan refugees in western Zambia (personal observations) and presently on lands surrounding Zimbabwe where political uncertainties are forcing people to exploit natural resources to survive.

2.2.6. HEALTH AND THE ENVIRONMENT

The environment – physical, economic and social – exerts a profound influence on health. Many of the world's health disparities derive from underlying environmental conditions. A wide range of factors (including water and sanitation, infections enhanced by environmental conditions, chemical toxins, poverty and even social conditions such as violence) threaten the health and development of individuals, communities and nations. The impact of physical environmental factors on human health throughout the world is sobering: each year 6 million people die and tens of millions more suffer serious illness from a combination of water-related diseases, indoor air pollution, urban air pollution and toxic chemical exposure.

Soil degradation has damaged one-fifth of the world's vulnerable dry lands and contributed to widespread malnutrition. Within the next generation, two-thirds of the world's people will live in water-stressed conditions that will further exacerbate a host of health issues.

Ecological disruption can have significant impacts on public health and the spread of disease. Development projects, such as new roads and infrastructure through wilderness areas, and land use changes resulting from logging, agriculture, migration, and urbanization, along with increased trade and movement of goods and people, can lead to increased exposure to disease. Loss of biological diversity may also reduce or eliminate control species that keep microbes in check.

Unsafe water, which spreads about 80 percent of all disease in developing countries, is the leading cause of public health concerns in sub-Saharan Africa. Lack of access to clean water supplies can spark a whole range of diarrheal diseases – including typhoid fever, hepatitis A, and cholera. This tragedy has its roots in two very common social problems: lack of clean drinking water, and lack of sanitation. Of course, these problems are closely related; in communities without adequate sanitation, pathogen-laden human and animal wastes, food, and garbage pile up near homes or drain into waterways to infect drinking supplies.

Global warming may exacerbate these changes in environmental conditions. It may contribute to increased numbers and more severe floods, storms and droughts, as well as lead to change in rainfall. These types of changing weather patterns can produce the right conditions for disease. Scientists estimate that a global mean temperature rise of 3 Celsius could create ecological conditions conducive to malaria in 60 percent of the world's land area, compared to a current 45 percent. Similar outcomes, resulting from changes in temperature and rainfall, will also occur for other diseases, such as schistosomiasis.

Diseases induced by environmental degradation will likely have adverse impacts on both social structure and economic productivity of communities. Although it is difficult to quantify these adverse effects, the impact of HIV/AIDS on human productive capacity and economic growth in Africa may provide some indication of how this dynamic might work.

While health risks from deteriorating environmental conditions represent a global threat, those living in developing countries pay the highest price, often bearing the double burden of traditional environmental risks associated with poverty and population density, and the modern environmental hazards of growing industrialization with weak regulation.

Social environments play an equally important role in influencing human health. Unsafe and unjust social factors, such as grossly unequal access to health care, risky behavior, violence, substance abuse, gender inequity, family-structure breakdown and political instability, undermine the health and wellbeing of individuals and communities.

The economic environment, from the household level to systems of global commerce, links many of these issues and can be a force for both good and ill. Abject poverty is strongly associated with poor health, both as cause and as effect. And economic issues often drive both physical and social factors.

Over the past generation, vital lessons have been learned in addressing environmental threats to health among the poor. In some cases, preventive actions aimed at environmental factors have benefited many; in others, mitigation of environmental effects through clearly

directed health program interventions has been more practical (Global Health Coalition, 2003).

2.2.7. FOOD SECURITY AND THE ENVIRONMENT

There are limitations placed on food security by the environment, as well as opportunities for interventions (please refer to the sections under Conflict and the Environment, Southern African Region – Opportunities, and Enhancing Food Security). Factors such as low and variable rainfall, drought, and large areas of marginal land constrains the food production potential of the region. Significant land and water resources have been degraded to varying degrees as a result of a number of threats in the region. Thrupp in 1997 highlighted:

- Land and soil degradation, or the loss in biological or economic productivity. Land degradation has a number of dimensions and causal factors. Agricultural lands may suffer from soil erosion and soil nutrient depletion due to inappropriate practices. Overgrazing and poor management of pastoral lands may lead to soil erosion and desertification.
- Biodiversity loss, here referring to the “agrobiodiversity” on managed or productive land can lead to lost productivity, as agricultural practices tend toward monoculture. This threat includes the loss of genetic diversity within domesticated plant and animals, which reduces future options for improved varieties and more productive or resilient agricultural pastoral systems.
- Deforestation, together with the loss of other woody vegetation, contributes to land and soil degradation, and erosion of biodiversity; and
- Natural constraints. A number of inherent biophysical constraints limit productivity potential. Those constraints include poor soil, variable and limited rainfall, recurrent patterns of drought, flooding and susceptibility to pest infestation.

2.2.8. URBANIZATION, ECONOMIC DEVELOPMENT AND THE ENVIRONMENT

Sub-Saharan Africa is faced with a wide range of strategic choices related to urbanization, economic growth and the environment. None of these choices will be simple “either-or” decisions. Most of them will require an appropriate balance to be established between seemingly contradictory orientations. Only a truly cooperative and collaborative effort between the international, national and local communities will lead to the achievement of productive and sustainable results. The following are nine key environmental and economic issues (Erbach, 1998):

- ***Globalization and Self-Sufficiency:*** While the lack of foreign investments, a negligible involvement in international trade, and a steep decline in export revenue, coupled with limited domestic savings and investments, have plagued Africa in the past, a new sense of commitment now exists to connect Africa to the global economy.
- ***Exports, Trade and Import Substitution:*** An effective balance needs to be established between policy and investment priorities that promote the production of necessary

exports to repay international debt and those that encourage the development of products for domestic consumption as a means to replace unnecessary imports and foster greater self-sufficiency. Recent evidence indicates that foreign investment may be rising on the continent, and in the foreseeable future the economic picture may change for the positive.

- ***Traditional and Modern Patterns of Consumption:*** Evolving patterns of consumption will determine the essential balance to be reached between export and import substitution throughout sub-Saharan Africa. This creates an urgent need to redefine the direction of development in order to avoid the growth of exorbitant, wasteful patterns of consumption and to achieve a progressive reduction in the un-ecological exploitation of resources.
- ***Natural Resource Inputs and Urban Waste Outputs:*** The most critical environmental relationship between sub-Saharan cities and their rural hinterlands involves the cycle of natural resources and wastes that flow between them. Urban areas are man-made ecosystems that depend on the surrounding natural and agricultural ecosystems to supply the renewable and non-renewable products, resources and goods that they need and to provide the very important biological, physical and chemical processes that ensure sustainability. The relationship between urban resource use and waste provides a tremendous challenge and opportunity to the international community to apply its knowledge and experience working with natural and agricultural ecosystems to an urban context.
- ***Environmental Protection and Economic Growth:*** Environmental protection and economic development have often been viewed as separate, if not opposing, activities. Discovering how to combine these two imperatives, without endangering their respective importance and value to African cities lies at the heart of any new urbanization approach.
- ***Green and Brown Environmental Agendas:*** Visible improvements in the “brown” agenda will increase African environmental awareness and support for the “green” agenda as well. There can be no success in conserving natural if human habitats are left unattended to crumble and die through poverty, joblessness and unhealthy living conditions.
- ***Private and Public Sector Financing of Infrastructure:*** As African cities continue their rapid growth, the inability of local governments to finance the most basic infrastructure necessary for economic development will become an extremely critical constraint. The ways in which private capital is deployed will ultimately have far greater impact than public sector funds on the environmental future of sub-Saharan countries. A productive partnership is required between the public and private sector.
- ***Western and Locally Based Planning:*** The application of new urban planning approaches to this region can make a major contribution to the creation of sustainable urban development and land use patterns that are environmentally compatible, economically efficient and socially equitable.
- ***Mechanical and Ecological Engineering Solutions:*** A frank assessment of the environmental conditions and financial capabilities of African cities leads to the

conclusion that lower-cost, information-based and locally created ecological engineering solutions can have more immediate and long term beneficial effects than expensive, mechanical systems that are simply imported from abroad.

Six major areas of concern and opportunity are: local government and community level environmental action; urban-rural linkages; low-income neighborhoods and housing; energy use, climate and health; information and networking as tools in urban management; and mitigation of “brown” pollution through land use planning.

2.2.9. INSTITUTIONAL CONTEXT

A number of institutional challenges confront the environmental management situation in the RCSA region and throughout Africa. These challenges cut across the preceding themes. Critical issues and challenges include:

- ***Lack of integration of environmental concerns into development.*** “Environmental sustainability” is a relatively new concept on the agenda of most African governments. While the recent flurry of NEAPs, creation of environmental management institutions, and the development of environmental policy and legislative frameworks have raised consciousness, actions “on the ground” have been limited by a lack of knowledge on how to apply relevant integrative tools;
- ***Lack of integration of development concerns into the environmental agenda.*** Swartzendruber et al (1998) write that “The environmental agenda remains dominated by a false dichotomy between “development” and “environmental protection.” Both sides need to understand the linkages between the two, and the possibilities for “win-win” situations;
- ***Limited institutional capacity.*** This catch-all phrase for institutional shortcomings is particularly relevant to environmental management institutions, which are generally young and at present, lower priority institutions in most RCSA countries. Underfunded, understaffed, under-trained, and unempowered institutions may be no match for the task at hand;
- ***Lack of regional cooperation.*** This issue represents a large obstacle to sound management of transboundary ecological units such as lake basins and rangelands;
- ***Lack of local engagement.*** Raising environmental awareness and capacity among central authorities alone is insufficient to stem the tide of environmental degradation. Involving local population stakeholders – those closest to and most directly affected by natural resources – is critical for the successful design and implementation of activities at the local level;
- ***Lack of private sector engagement.*** The growing role of the private sector in African economies represents both a threat and an opportunity - the private sector can lead the crusade towards environmental sustainability, or it can spearhead the charge towards environmental exploitation. The private sector must be appropriately engaged; and

- **Globalization.** Swartzendruber et al (1998) observe that world economic trends will increasingly affect the African situation. As movement of people and goods increases in response to economic opportunity, new types of environmental issues will emerge.

2.3 Southern Africa Region – Threats

Sub-Saharan Africa is currently in the middle of the most important demographic and economic transition in its history. This ongoing, social change is a virtually irreversible historical event that affects all countries in the region. It is characterized by high population growth, widespread urbanization and very rapid growth of the largest cities. Some of the major forces that have driven and will continue to drive this transition include the:

- Ongoing agrarian crisis;
- Mass migration towards large cities;
- Widening gap between population and economic growth;
- Absence of newly industrialized countries with dynamic cities; and
- Inability of surplus population to emigrate to less populated countries.

Sustainable development in Sub-Saharan Africa cannot be achieved until the urgent problems of poverty and inequality within cities have been addressed. A comprehensive perspective is required that integrates environmental, social and economic goals based on an understanding of the critical linkages that exist between these goals and the manner in which they relate to both urban and rural areas. Newly emerging urban Africa and its linkages with rural hinterlands and the natural environment present a tremendous opportunity to develop new, ecologically sound societies based on: 1) minimizing the use of non-renewable resources, 2) developing alternative renewable resources, and 3) creating ecologies, practices and products that are durable, safe and responsive to the genuine needs of the population.

However, three decades after Stockholm and a decade after Rio, environmental protection is still considered as anti-development. The intrinsic properties of ecosystems are not well appreciated, and consequently, biota are not seen as important indicators of the health of aquatic ecosystems –river, lake, or wetland –upon which the livelihood of millions of people, livestock, and wildlife depends, and which comprise important habitats for biodiversity.

The environment of the southern African sub-region, like other regions in the world, is threatened by increasing human demands. Here regional poverty, high population growth, local political instability, regional climatic instability, a lack or degradation of infrastructure, shortages of food and water, poor health (including HIV/AIDS) and relatively low levels of formal education are all giving rise to the degradation of natural resources. Although some parts of the sub-continent are still relatively unscathed by human actions, environmental problems have increased to the point that there is now a clear need for improved environmental management. Effective management of this nature needs to be based on realistic information, which takes cognizance of the major environmental assets and threats.

African political boundaries are largely an inheritance of colonialism. Although international borders sometimes follow natural features such as rivers and mountain ranges, the distribution of natural resources and of people of various affiliations are usually at odds with these borders. Relatively recent political and economic differences and differences in land ownership between these countries led to differences in the levels of landscape degradation while east-west and north-south gradients in geography and climate maintain large-scale differences in vegetation that in turn affects resource availability (see Appendix A, Figure 3). When superimposing political, economic, social and agricultural variables onto these landscape gradients it is not surprising that the environmental profiles of the 11 countries included in the present analysis differ so dramatically. However, in spite of these differences, the natural environment of the countries of the sub-region has much in common. For the purposes of this report, it thus makes sense to deal with the sub-region as a single entity, rather than on a country-by-country basis.

24. Southern Africa Region – Opportunities

The short list of southern Africa's common environmental threats that introduced section 2.1. above was drawn up on the basis of the most recent evidence available. It is thus disheartening to note that the same problems were listed eight years ago by SADC (1994). Far from being reduced, it is probable that the threats have intensified over those years, and that they will continue to do so. It seems reasonable to state at this time that the rural parts of southern Africa are trapped in a downward spiral of poverty-environmental degradation that will continue unchecked unless some meaningful intervention can be made. Conventional economic development efforts will not serve to break this spiral. The people caught up in it are unfortunately irrelevant to conventional economic forces: they have no product of value to contribute to the conventional economy, so it ignores their existence. This situation will not change over the next decade, or the next century. To make matters worse, rural people caught up in this situation would normally resort to subsistence livelihoods, but given the extent of natural resource degradation that exists in southern Africa even this last resort has been seriously eroded.

However, there is a possibility for meaningful intervention to occur, and it creates a very real opportunity for USAID/RCSA action. It is possible for a program of labor-intensive natural resource rehabilitation to be launched across southern Africa, in essence recreating the forests, woodlands and grasslands that have been lost. The process of rehabilitation would generate significant positive externalities in the form of restored environmental services: carbon sequestration, flood abatement, improved water quality, reduced soil erosion, etc.

Environmental resources make a significant contribution to rural incomes, sometimes as much as forty per cent. The loss of the resources through land degradation can thus exacerbate significantly the poverty experienced in rural areas. Rural households make use of a wide variety of natural resources, including wild foods; wild medicines; wood for

energy, construction materials, furniture, household utensils and agricultural implements; grasses and reeds for thatch, mats and baskets; livestock fodder; and water.

With the exception of South Africa, individual country markets for agricultural products are relatively small in the SADC countries. This creates the opportunity for expanded inter-regional agricultural trade and other forms of agribusiness collaboration, which is now feasible because of the increased political stability in the region. This collaboration may also make the region more competitive internationally, as it could be based on the relative comparative advantages of various individual countries. For example, countries such as Zambia and Mozambique have great agricultural potential, but relatively weak management capabilities and support structures. South Africa, by contrast, has less fertile soils and scarce water supplies, but substantial management capacity, good infrastructure and strong financial institutions. Greater trade could thus benefit all these countries: specifically, over the longer term it might make sense for South Africa to import less water and instead import foodstuffs that are water-intensive. Agribusiness collaboration could also substantially increase the overall amount of food that can be produced in the region, thereby contributing to improved food security.

Additionally, compared to some other parts of the world, in particular some of the wealthier ones that generate significant ecotourist traffic, southern Africa still has a *relatively* unspoilt environment. This provides the region with a comparative advantage for ecotourism. However, to exploit this advantage requires the countries in the region to market themselves as 'green countries', where the environment matters. They do not do this currently, and this report provides some evidence that they would be hard pressed to do so honestly. Thus a change in mindset could open up significant new economic development opportunities: the countries in the region could adopt a deliberate strategy of 'conservation-based community development'. Not only would this encourage ecotourism by taking the southern African region to the forefront of the 'economy through ecology' notion that is beginning to emerge in international thinking (the idea that a new economic revolution to rival the agricultural and industrial revolutions may be imminent, this time driven by ecological imperatives), but it would also help to address many of the environmental threats that have been identified in this report.

2.4.A. REHABILITATION

Rehabilitating southern Africa's rural natural resource base is not only important for the people actually living in the rural areas. Many inhabitants of the region's cities maintain urban-rural links, and these do not necessarily diminish with people's length of stay in the city. Many households retain cattle and land in the villages from which they come. These rural assets have both monetary and social assets and act as safety nets for households with uncertain livelihood prospects in the city. Rural rehabilitation could thus have a significant overall impact on the poverty problem in southern Africa.

Rehabilitation could also increase food security, as food-bearing trees could be reintroduced as part of the vegetation mix. Edible insects, rodents, birds and small

mammals would also return to the now degraded areas if their vegetation were to be rehabilitated (Scholes, 2003).

To fund this activity requires the positive externalities to be internalized. Financial resources for this exist internationally in such forms as the World Bank's Community Development Fund and Biocarbon Fund, and the Global Environmental Facility which supports actions that serve to implement international conventions on climate change, biodiversity conservation and combating desertification. Once funds are mobilized they can be used as incentives that will bring into existence new livelihoods for 'tree farmers', who will be paid to undertake resource rehabilitation and then to conserve what has been rehabilitated.

To repeat what was said above: the people in rural southern Africa have no product of value to contribute to the conventional economy, so it ignores their existence. The reason for this is that the conventional economy does not internalize externalities. Once externalities are internalized, and especially in this instance positive externalities, these people do have a product of value, namely the environmental services that would result from natural resource rehabilitation. Environmental economists have been arguing for decades that economies need to 'get prices right' by internalizing externalities. Therefore it is simply the correct application of economic principles that is needed as an intervention to deal with a significant proportion of the environmental ills facing rural southern Africa. It is obvious that RCSA could play a significant role in this intervention.

2.4.B. RENEWABLE ENERGY

There is scope in southern Africa for a proper study of the potential of renewable energy sources, in particular biomass, solar and wind energy. The dominance of Eskom in the region's electricity supply, and the very cheap but unsustainable coal-based power that Eskom supplies, have caused the possible exploitation of these alternative energy sources to be ignored to a significant degree, simply because they could not be competitively priced. In fact, however, Eskom's electricity is very cheap mainly as a result of a market failure in the form of a failure to internalize the negative externalities (carbon dioxide, air pollution and acid rain) that result from burning coal. The internalization of these externalities, coupled to temporary infant industry support for alternative energy industries, may well make the latter competitive.

25. USAID Bilateral Environmental Programs

This section briefly reviews the response of ESA USAID missions to regional environmental threats. Information presented is at a very general level. However, it is noted that the level of environmental programming, both in terms of the targeting and number of SOs, is significant and seems, at least for the purposes of this review, generally appropriate.

Of particular note is the large focus on biodiversity conservation in countries identified as priority biodiversity (and also tropical forest) areas, and various environment and natural resource management (E/NRM) SOs in countries with significant forest resources or critical environmental issues: specific biodiversity/ENRM SOs have been developed in Uganda, Kenya, Tanzania, Madagascar, Malawi, and Namibia. A regional NRM SO has been formulated by USAID's RCSA. SOs including significant components (IRs, RPs) in ENRM are found in Mozambique, Zambia, Zimbabwe and South Africa. All REDSO SOs have been subjected to initial environmental examination and have had environmental considerations built into them. Several Missions pursue sustainable agriculture and NRM objectives via Title II Food Aid for Development programs implemented by PVOs, usually as part of a rural development SO: Ethiopia, Kenya, Madagascar, Mozambique, Rwanda, and Uganda. For more specific information, readers are referred to R4 reporting documentation and CSPs available from the USAID and FRAME web sites.

Six southern Africa missions have significant environment and natural resource management (E/NRM) SOs. Madagascar and Zimbabwe each have had programs focusing on biodiversity conservation and CBNRM; Botswana's NRMP ended in September 1999, but elements of it are being carried forward in RCSA's SO 3, Increased Regional Cooperation in the Management of Shared Natural Resources. These three countries (or regions which they are a part of) were identified as priority areas for biodiversity conservation. Madagascar also has significant forest assets at risk, which are also targeted by their E/NRM SO. Botswana, Malawi (proposed SO), Mozambique, and Namibia each have more general "sustainable NRM" SOs. The DRC benefits from the regional CARPE program aimed in part at conservation and sustainable management of the DRC's significant forest resource. South Africa has an urban (housing) SO, with an IR specifically oriented towards environmental results, such as energy and water conservation. Several missions also program environment funds into SOs in other sectors: Economic Growth, Agriculture, Private Sector (Mozambique) and Rural Enterprise (Angola, Botswana, Malawi, Mozambique, Zambia); Democracy and Governance (South Africa, Zambia); and Health (Zambia). USAID, through the Southern African Regional Program (SARP), has supported several natural resources management programs in the SADC region since the early 1980s. USAID's in Botswana, Malawi (NATURE), Namibia (LIFE), Zambia (ADMAD) and Zimbabwe (CAMPFIRE) pursued bilateral programs focusing on a variety of approaches toward Community-based Natural Resources Management (CBNRM). These were regionally coordinated by the SARP Natural Resources Management Program (NRMP). RCSA provided support to specific activities such as the Regional Networking and Capacity Building Initiative for Southern Africa (NETCAB), implemented through IUCN since 1995. A complementary initiative, supported by RCSA, is the Natural Resources Accounting project aimed at establishing the economic value of the region's natural resources in order to incorporate these into national accounts.

3. RCSA Strategic Response

This section reviews each of the four major RCSA strategy components:

- Enhanced Southern African Competitiveness in Global Markets and a More Integrated Regional Market;
- Improved Democratic Governance;
- Enhanced Regional Food Security;
- Water Resources Management.

3.1. Enhanced Southern African Competitiveness in Global Markets

The African sub-region is one environmental sub-entity with environmental constraints well apart from the political boundaries. Additionally, it true with economies of scale, it is nearly always easier, and on order of magnitude cheaper, to perform certain activities at a regional level rather than individually or country-by-country.

Elsewhere in this document agribusiness was refereed to as an illustration of the enhanced competitiveness that could result from viewing the subcontinent as a single entity. It was suggested, for example, that South Africa's management expertise could be linked to the inherent agricultural potential of countries such as Angola or Zambia. However, a note of caution should be sounded here. South Africa, as the most developed economy in the region, might be viewed as a model for the development of the rest of the region. This could prove to be costly mistake.

Much of South Africa's past economic growth has been both environmental and socially unsustainable. Minerals, for example, have benefited a few individuals only at great cost to many others and the environment. It has also been noted elsewhere in this report that the country's current dependence on electricity dependent industries is unsustainable. This points to the dangers of failing to internalize environmental and social externalities through full cost pricing and underlies the recommendation that has been made in this report that the pursuit of such internalization should be a priority of RCSA's strategic plan.

Many of the opportunities now arise from having the technology to predict the consequences of climate change for industrial and sub-industrial activities across the sub-continent. Favorable responses to such predictions could withstand much of the threat

imposed on agricultural productivity, food security, natural resource based degradation, etc.

New ways of conservation development on a sub-continental scale rather than within the framework of limitations imposed on the country scale will provide new opportunities to secure biological diversity and all the economic effects associated with it. Conservation efforts that stretch beyond boundaries by organizations such as Conservation International deserve further support.

Thus, Sub-Saharan Africa is faced with a wide range of strategic choices related to economic growth and the environment. None of these choices will be simple "either-or" decisions. Most of them will require an appropriate balance to be established between seemingly contradictory orientations. Only a truly cooperative and collaborative effort between the international, national and local communities will lead to the achievement of productive and sustainable results.

Evolving patterns of consumption will determine the essential balance to be reached between export and import substitution throughout sub-Saharan Africa. This creates an urgent need to redefine the direction of development in order to avoid the growth of exorbitant, wasteful patterns of consumption and to achieve a progressive reduction in the un-ecological exploitation of resources. Sub-Saharan governments need to take actions that will encourage the use and consumption of locally made products as opposed to those coming from abroad.

From the environmental perspective it is also important to 'get prices right' by internalizing environmental externalities so as to ensure that the enhanced competitiveness is both sustainable and built on true comparative advantages. The promotion over the past few years by South Africa of carbon-intensive export industries appears to be a southern African illustration of how 'competitiveness' should *not* be enhanced. As a springboard to enhanced competitiveness in *global* markets, increased trade *within* the region should be encouraged by building on the comparative advantages of the various countries in the region that result from divergent natural resource endowments. For this an environmental-economic analytical mechanism is needed that is proactive and very different from the traditional environmental impact assessment that is usually considered to be sufficient to deal with the environmental-economic interface of any proposed development project.

But it also seems that a prerequisite for success here is a new image for southern Africa in the eyes of the rest of the world, something that indicates that the chaotic conditions that have characterized the past few decades are now a thing of the past. Obviously this needs to include a picture of political stability. But from the environmental viewpoint, as was noted in the context of Comment 5 above, it is important that this image also include a picture of environmental awareness, especially if it is true that the world may be on the brink of a new economic revolution based on ecological imperatives (as was also noted in the context of Comment 5 above).

Why should the US be concerned about environmental stresses in Africa? Left unattended, these environmental issues are likely to build up and work against efforts to stimulate economic growth. National economies which are still largely dependent on the agricultural sector and agro-sylvo-pastoral production systems cannot grow and prosper in the face of continued degradation and depletion of farmland, pastures and woodland. Rural populations cannot aspire to improved socio-economic well-being if they are denied access to or control over critically important land and water resources, or have no incentive to invest in their sustainable use and improved management. If urban economies are undermined and rural communities remain poverty stricken, potential markets for US goods and services do not materialize, and trade fails to expand.

3.2. Improved Democratic Systems

In the decade that has passed not only have democratic movements seen some gains and democratic processes have taken root, but also a whole gamut of issues relating to ecology and environment have risen with profound implications from the local to the national level. The emerging issues of ecology and environment also cut across questions of political economy, ethnicity, class and the politics of power of global institutions and the market. More importantly, there are growing links at many levels between environmental degradation, and destruction of livelihoods. These multilayered links have deep and fundamental consequences for democracy today and the prospects for democracy in the future.

Critical to the developing countries are issues such as conflict (also tackled in the section entitled, "Conflict and the Environment"), the destruction and privatization of common lands, common property resources, bio-diversity, forest destruction, in-roads made by commercial forestry on forestlands and agricultural areas, plantation forestry and privatization. The expansion of economic activity can lead to rapid destruction of common lands and common property resources. In that sense, the threat is not only the degradation and destruction of actual habitats and spaces, but also the speed at which it happens, allowing little time to resist, stop or to undertake ecological and social restitution activities.

Much of the democracy and governance SO work is undertaken with NGOs and local governance partners. It is at this level that policy implementation that makes up national policy usually takes place. It is therefore extremely important that the analysis of environmental threats and opportunities undertaken in this study be contextualized within the operations of that SO. For example in Zimbabwe, the Communal Areas Management Programme For Indigneous Resources (CAMPFIRE) program has promoted the local management of wildlife resources while simultaneously inculcating a tradition of democratic political decision-making at the village level. Through this process, local communities have been able to utilize revenues from wildlife concessions to improve their quality of life through activities such as building schools, installing electric water pumps, and initiating community convenience stores.

Additionally, several references have been made in this report to the benefits for environmental management that could result in increased regional integration. RCSA could contribute to such integration by supporting efforts to introduce regional governance in Southern Africa. NEPAD, SADC, COMESA are example of these efforts.

3.3. Enhanced Regional Food Security

As we mentioned under the previous sections on Conflict and the Environment, Food Security and the Environment and Southern African Region- Opportunities/Rehabilitation, the causes of food security include loss of land and soil degradation, deforestation, natural constraints, loss of biodiversity, population, migration, and conflict. Additionally, food security in southern Africa appears to be seriously threatened by climate change. This seems to call for much improved management of staple crops at a regional level, in order to reduce the risk of crop failure by spreading it over both time and space.

Emerging opportunities to enhance food security in the region include political stability, cognizance of climatic change and technology, and optimizing the natural resource base by modifying agricultural production systems and taking advantage of biodiversity as a source of food and a source of income. For example, restoring the productivity of land by rehabilitating previously constrained areas will enhance the availability of both animals and plants as food and as a source of income (please also see section 2.4.a. on Rehabilitation).

Additionally, there are many threats posed to African food security by mono-cultures (production of single crops). However, enhancement of crop diversification (from heterogeneity of food consumption systems to poly-producer systems) would give a degree of food assurance and food security. The diversification of rural livelihoods referred to on page 8 of the RCSA's Concept Paper is strongly supported by this ETOA. It must be emphasized, however, that an increase in agricultural productivity needs to be sustainable, and given the harsh environmental conditions that prevail in much of southern Africa this is likely to require alternative production methods and new crops to be introduced. As regards the latter, in some cases this may require no more than knowledge sharing; in some areas of southern Africa, viable crops are not grown simply because traditionally they were not known, and this prevents crop diversity that could add to food security.

Also, new political stability in Southern Africa enables a greater reliance on comparative advantage in food production. "Wet" countries can grow "wet" food and dry countries can grow "dry" food. Additionally, as wet and dry areas change with time and as with modern technology one can now predict weather patterns: this would allow agricultural producers to take advantage of changes.

Additional recommendations to enhance food security and reduce pressures on natural resources and biodiversity include:

- Promotion of soil fertility and conservation measures. Such measures should emphasizing biological and physical factors rather than chemical ones.;
- Effecting a seed multiplication program in the target areas.;
- Strengthening of the existing agricultural extension service and mobilization of local farmers into cohesive farmers groups.;
- Improving overall farm management. The introduction of alternative sources of draught power such as donkeys needs to be stimulated and propagated. Donkeys are better than oxen because of their resistance to trypanosomiasis, especially in valley areas.;
- Enhancing agricultural production through promotion of small-scale irrigation schemes.
- Boosting overall agricultural development and promotion of drought tolerant crop varieties for local consumption and marketing.
- Promoting improved livestock production.
- Diversification of livelihood options from sustainable use of natural resources

3.4. Water Resource Management

Water resource management is discussed in other sections of this report, and the discussion here should be seen as supplemental to that which is provided elsewhere. As we have mentioned, water is far more of a problem when Southern African countries are viewed as independent countries as opposed to a single geographic entity. Therefore, the management of water resources at a regional level is a matter that deserves much greater attention than it has received to date. There is now opportunity to do this given the greater stability of the region. There are seven major watersheds (see section entitled “Watershed Perspectives”). If one could depoliticize the distribution of water, one could help ensure water security. From an ecological point of view, there is greater homogeneity within watershed more than between them.

Additionally, the distribution of water and the associated costs make it unavailable to people. Expensive piping is part of the problem. Water needs to be priced appropriately in order to implement demand management. This statement ties into two other themes that have been raised in this document. The first being environmental externalities that need to be internalized (please see the section entitled, “Southern Africa Region –Opportunities”) and the second being that food production needs to take place in appropriate places in the sub-continent. The development of water reservoirs (such as dams) in dry climate profiles causes them to lose water through evaporation.

Relocation of industry is colored by pricing policy. In a generally water scarce region, the development of exotic tree plantations is an inappropriate form of economic development. It is only made financially viable by inappropriate water pricing.

Thus, sustainable development and the use and management of water resources in ways that provide the most benefits for people, particularly the poor, while still ensuring that the

water resources are protected for the benefit of future generations, can only be achieved by paying adequate attention to the environmental aspects of water resources, and ensuring that environmental issues are brought into the mainstream of all decision-making regarding water resources.

3.5. Reduced Impact of HIV/AIDS through Multisector Response

Adding to what was said under the section on Health and Environment, RCSA should address the HIV/AIDS pandemic, which is affecting, and will continue to affect not only health, but also: 1) the economic well being of people; 2) social structures at the community and family levels; 3) the private sector; 4) the ability of the public sector to deliver services in all sectors; and 5) the environment. This strategic objective recognizes the need for a multisector response to reduce the impact of the epidemic. It should integrate activities to address short-term food insecurity and labor productivity issues of these affected vulnerable groups.

Appendix A. Tables and Figures

Table 1

Summary of biodiversity rankings of countries in southern Africa. Extracted from Cumming (1999).

RANKS	Angola	Botswana	Lesotho	Malawi	Mozambique	Namibia	RSA	Swaziland	Tanzania	Zambia	Zimbabwe
No. Vertebrate Species	3	9	11	7	5	8	2	10	1	4	5
No. Plant Species	5	10	11	7	4	8	1	9	2	6	3
Species per 1,000 km ²	9	10	2	3	7	10	5	1	6	8	4
No. Endemic Vertebrates	5	10	7	3	4	9	2	10	1	7	6
No. Endemic Plants	2	9	11	7	3	8	1	10	5	4	6
Total Rank Score	24	48	42	27	23	43	11	40	15	29	24
Overall Rank	4	11	9	6	3	10	1	8	2	7	4

Note: Rank scores from Table 2 (1 = highest and 11 = lowest).

Table 2

Forest Data. Forest area and area change for southern Africa and Africa as a whole (extracted from FAO, 2003).

Country/area	Land area	Forest area 2000				Forest cover change 1990-2000	
		Total forest ('000 ha)	% of land area (ha)	Area per capita (ha)	Forest plantation ('000 ha)	Annual change ('000 ha)	Annual rate of change (%)
Africa	2 978 394	649 866	21.8	0.8	8 036	-5 262	-0.8
Angola	124 670	69 756	56.0	5.6	141	-124	-0.2
Botswana	56 673	12 427	21.9	7.8	1	-118	-0.9
Lesotho	3 035	14	0.5	n.s.	14	n.s.	n.s.
Malawi	9 409	2 562	27.2	0.2	112	-71	-2.4
Mozambique	78 409	30 601	39.0	1.6	50	-64	-0.2
Namibia	82 329	8 040	9.8	4.7	n.s.	-73	-0.9
South Africa	121 758	8 917	7.3	0.2	1 554	-8	-0.1
Swaziland	1 721	522	30.3	0.5	161	6	1.2
Tanzania	88 359	38 811	43.9	1.2	135	-91	-0.2
Zambia	74 339	31 246	42.0	3.5	75	-851	-2.4
Zimbabwe	38 685	19 040	49.2	1.7	141	-320	-1.5

n.s. = not significant

TABLE 2A

Forest types, volume and biomass in southern Africa and Africa as a whole (extracted from FAO, 2003).

Country/area	Forest types (% of country's forest area)				Wood volume in forests		Wood biomass in forests	
	Tropical	Subtropical	Temperate	Boreal/polar	(m ³ /ha)	Total (million m ³)	(t/ha)	Total (million t)
Africa	98	1	0	0	72	46,472	109	70,917
Angola	100	0	0	0	39	2,714	54	3,774
Botswana	100	0	0	0	45	560	63	779
Lesotho	0	100	0	0	34	0	34	0
Malawi	100	0	0	0	103	264	143	365
Mozambique	100	0	0	0	25	774	55	1,683
Namibia	100	0	0	0	7	54	12	94
South Africa	68	32	0	0	49	437	81	720
Swaziland	86	14	0	0	39	20	115	60
Tanzania	100	0	0	0	43	1,676	60	2,333
Zambia	100	0	0	0	43	1,347	104	3,262
Zimbabwe	100	0	0	0	40	765	56	1,065

Table 2B.

Areas and percentages of forests under management plans and in formal protection.

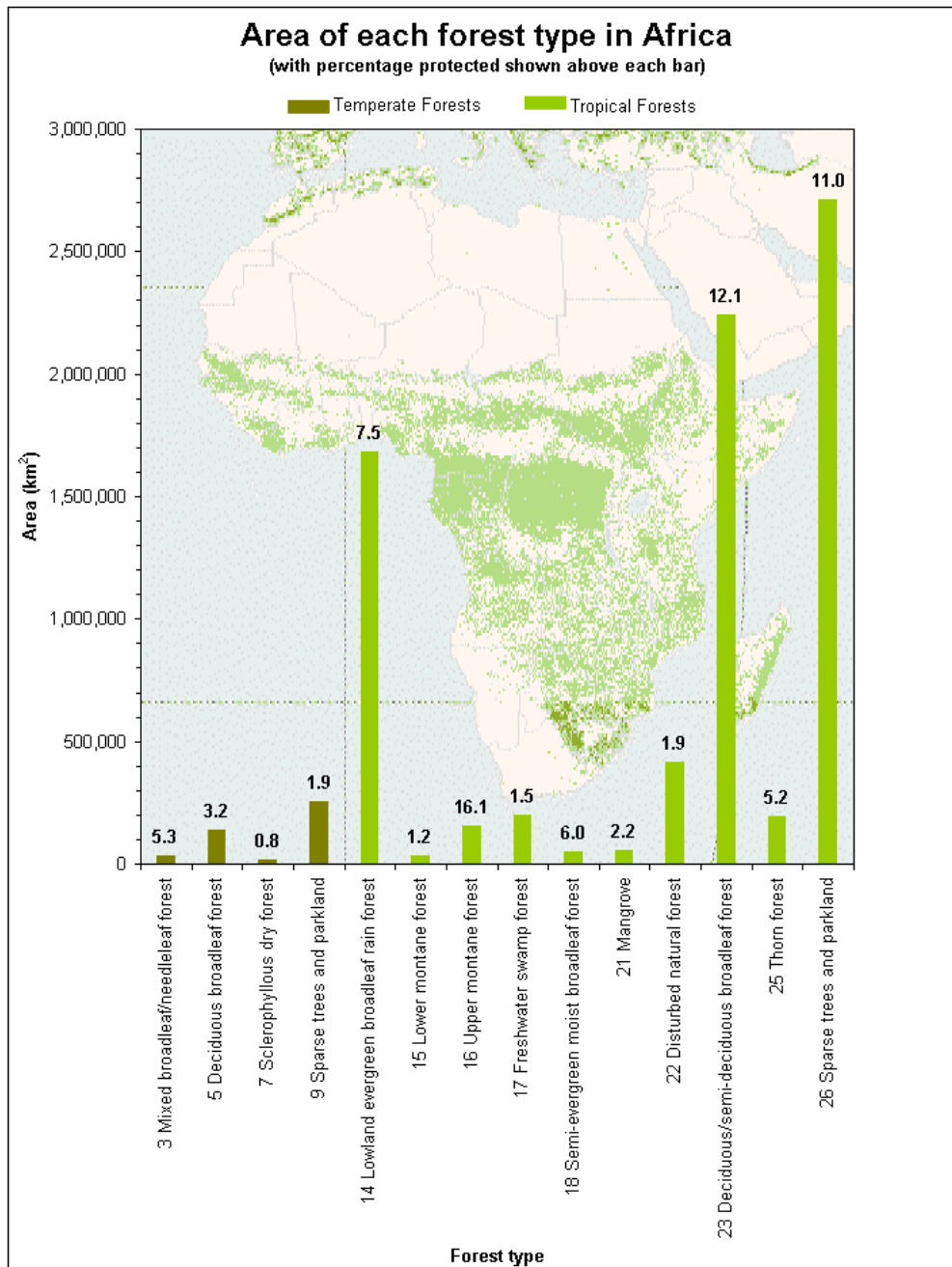
Forest in protected areas refers to areas within IUCN categories I to VI for nature protection. Percentage (of total forest area) was determined using an overlay (implemented by UNEP-WCMC) of FRA 2000 global maps of forest cover and the FRA 2000 global map of protected areas with legal protection status (see FAO, 2001).

Country	Forest area (000 ha)	Forest in protected area (%)	Area under forest management plans (2000)	
			Area (000 ha)	%
Angola	69,756	3	-	-
Botswana	12,427	26	-	-
Lesotho	14	16	n.s.	2
Malawi	2,562	45	-	-
Mozambique	30,601	7	-	-
Namibia	8,040	5	54*	n.ap.
South Africa	8,917	7	828*	n.ap.
Swaziland	522	4	-	-
Tanzania	38,811	14	-	-
Zambia	31,246	24	-	-
Zimbabwe	19,040	12	92*	n.ap.

Comment [TW1]: what is this? (see table 9 in FAO 2001)

**Partial results only. National figure not available.*

Table 3
African Forest Types: Distribution and area of forest types in Africa.



Source: <http://www.unep-wcmc.org/forest/afr.htm>

Figure 1

Reserves Sizes. The distribution of reserves sizes less than 1000km² in seven of the southern African countries. Compiled from various sources.

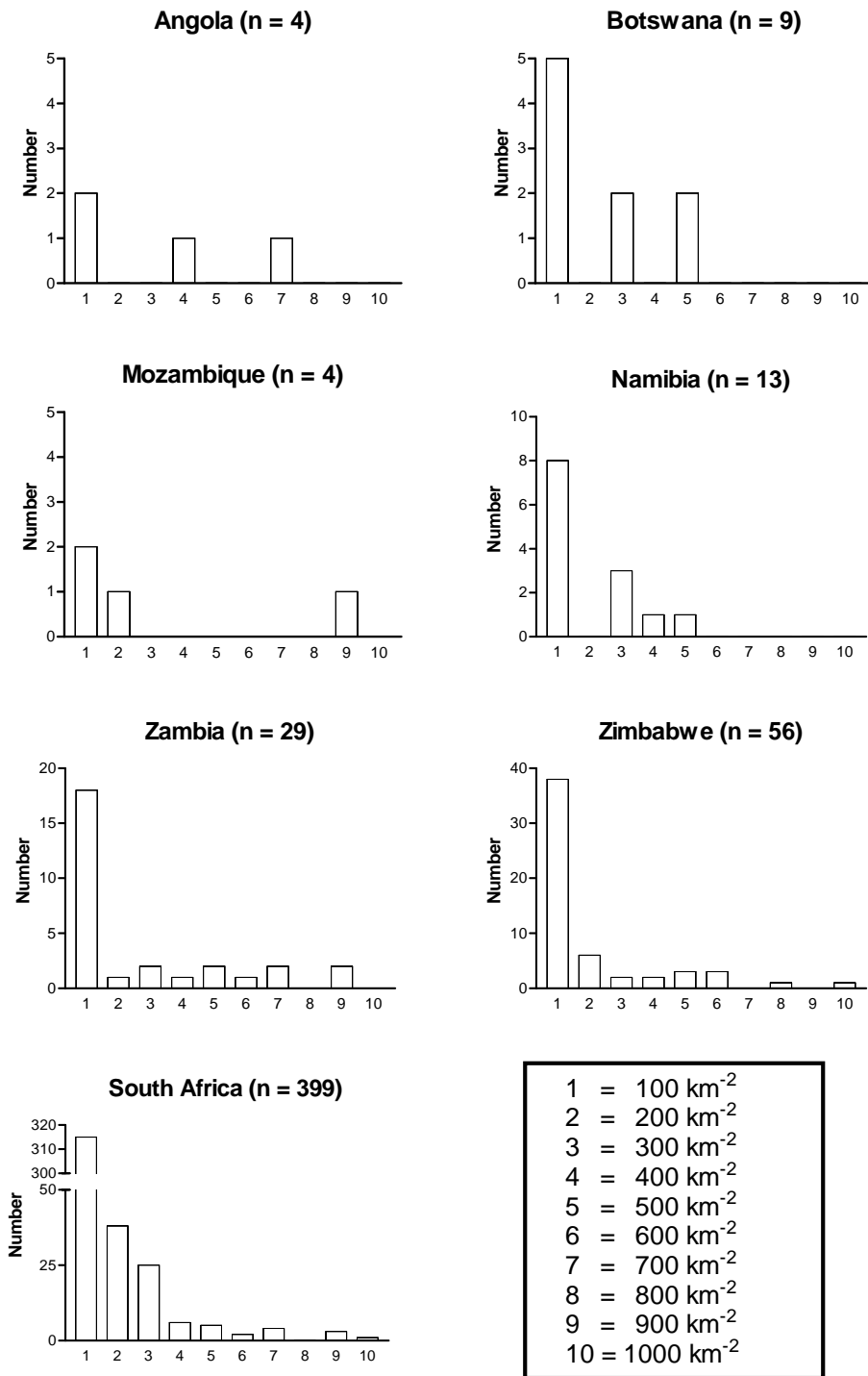


Figure 1A

The distribution of reserves sizes more than 1000km² in seven of the southern African countries. Compiled from various sources.

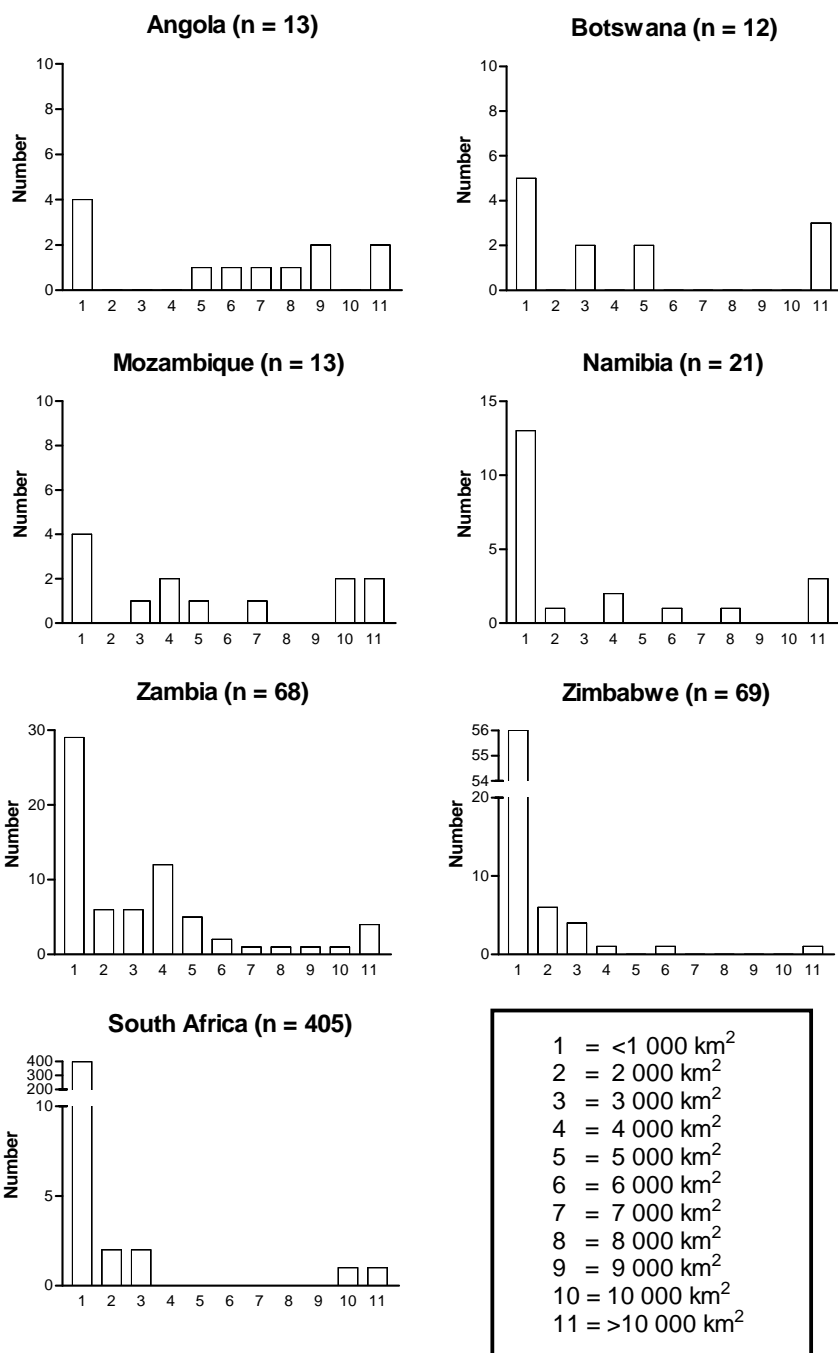
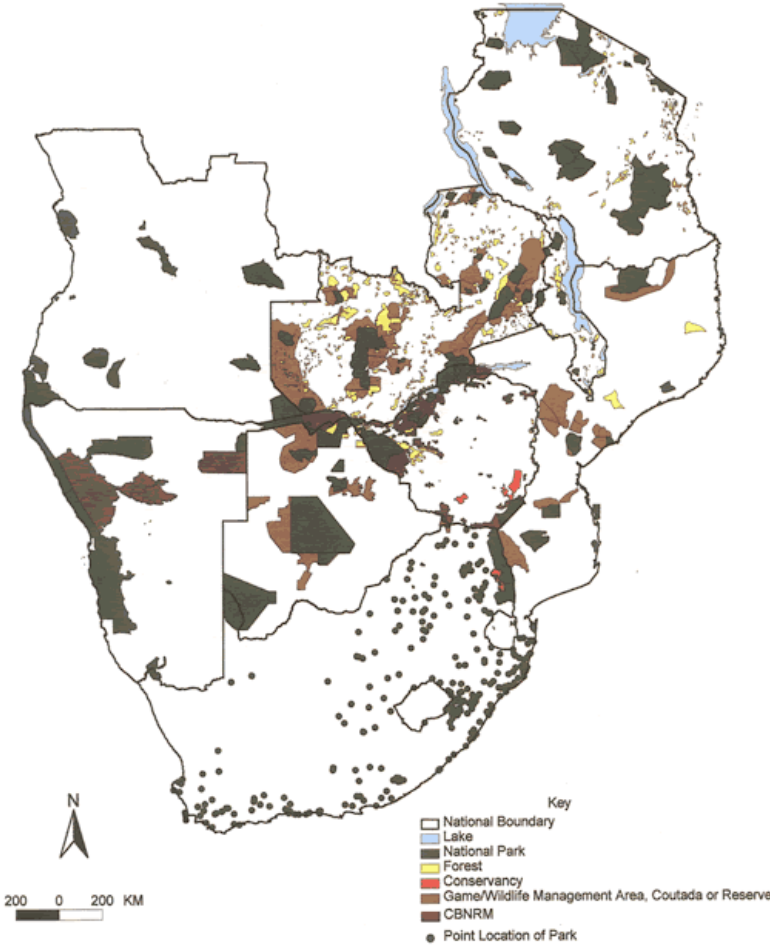
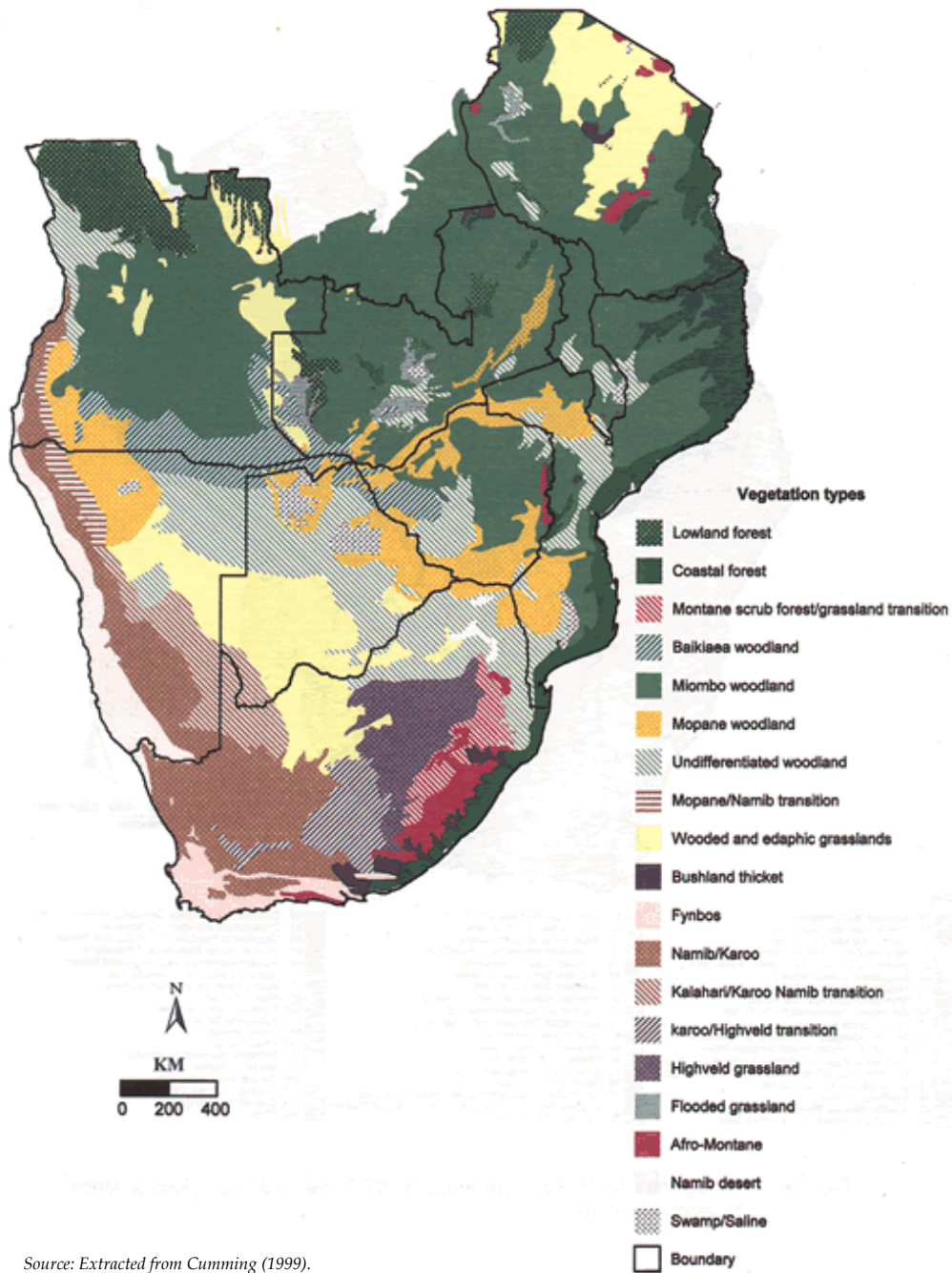


Figure 2
Protected areas and wildlife areas in southern Africa



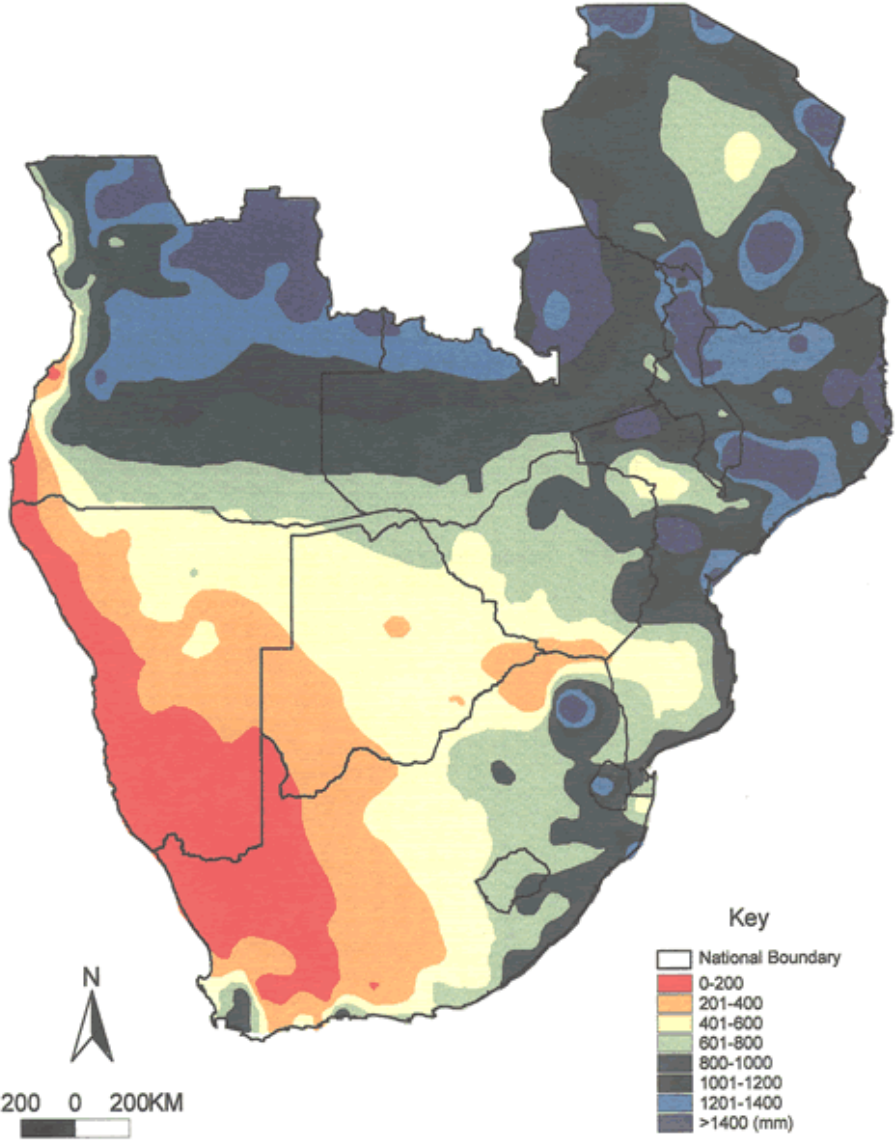
Source: *Extracted from Cumming (1999)*

Figure 3
Vegetation. Simplified vegetation map of southern Africa.



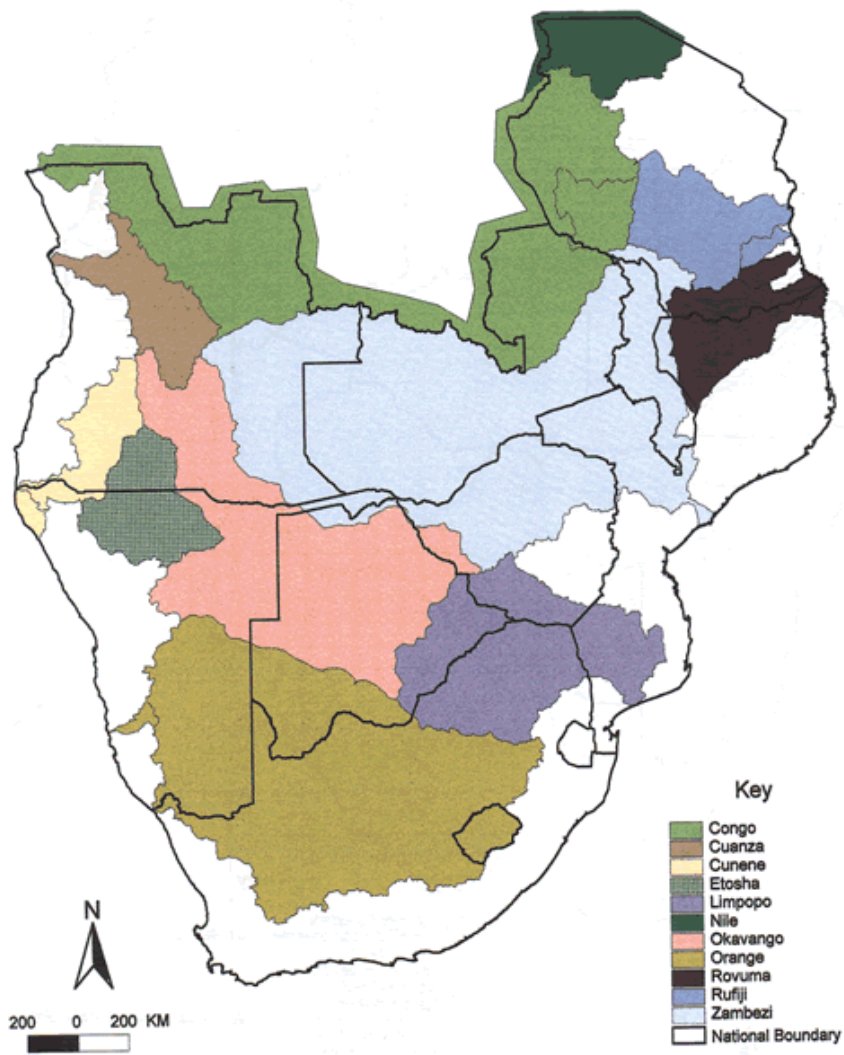
Source: Extracted from Cumming (1999).

Figure 3a
Rainfall. Mean annual rainfall until 1996 in southern Africa



Source: Extracted from Cumming (1999).

Figure 4
Watershed Basins. Major drainage basins of Africa.



Source: Extracted from Cumming (1999).

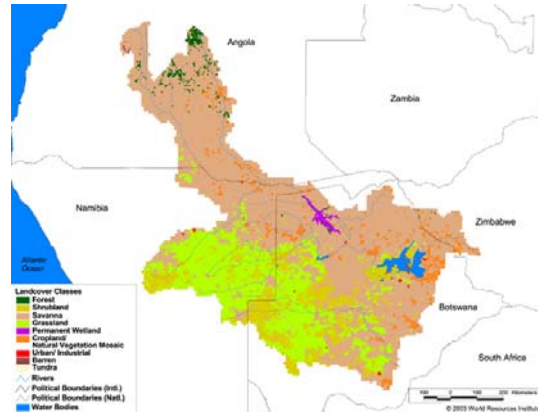
Note: This map includes two basins, the Rovuma and Etosha, that were not designated by the IUCN (2003) as major drainages because they do not have permanent rivers.

Appendix B. Major Watersheds of Southern Africa

A12 Okavango

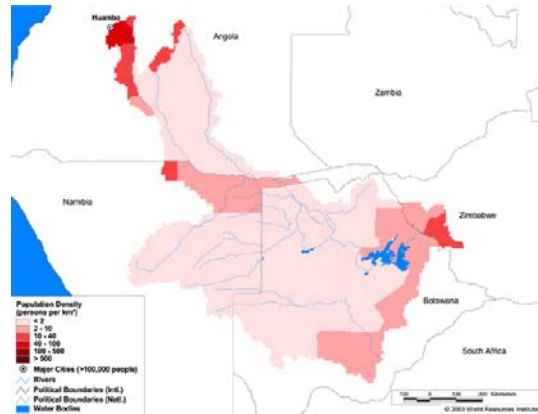
Land Cover and Use Variables

Forest Cover	1.7
Grassland, Savanna and Shrubland	91.1
Wetlands	4.1
Cropland	5.5
Irrigated Cropland	0.0
Dryland Area	86.4
Urban and Industrial Area	0.2
Loss of Original Forest Cover	0.0



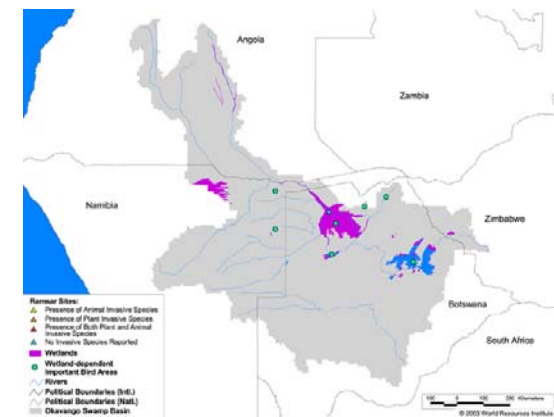
Basin Indicators

Basin Area (sq. km.)	721,258
Average Population Density (people per sq. km.)	2
Large Cities (>100,000 people)	1
Water Supply per Person (1995) (m ³ /person/year)	-
Degree of river fragmentation	-
Dams (>15m high) in Basin	1
Dams (>150m high) in Basin	0
Dams (>60m high) under Construction	0



Biodiversity Information and Indicators

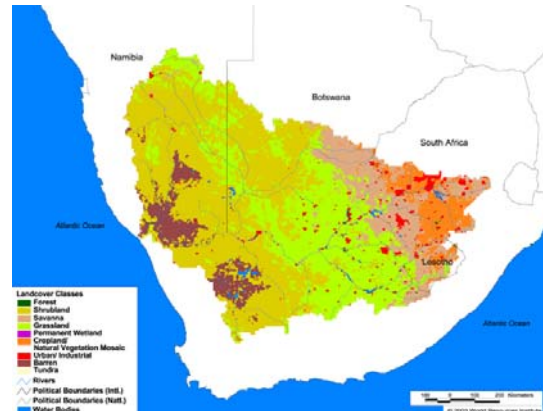
Number of Fish Species	80
Number of Fish Endemics	0
Number of Amphibian Species	55
Number of Ramsar Sites	1
Number of Wetland-Dependent IBAs	7
Number of Endemic Bird Areas	1
Protected Area	12.1



A13 Orange

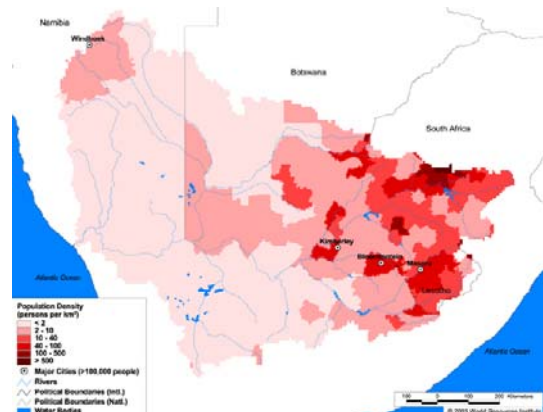
Land Cover and Use Variables

Forest Cover	0.2
Grassland, Savanna and Shrubland	85.0
Wetlands	0.8
Cropland	
Irrigated Cropland	0.5
Dryland Area	82.8
Urban and Industrial Area	2.2
Loss of Original Forest Cover	99.9



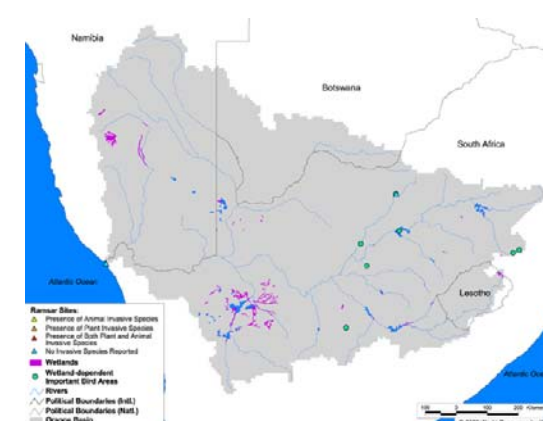
Basin Indicators

Basin Area (sq. km.)	941,351
Average Population Density (people per sq. km.)	10
Large Cities (>100,000 people)	4
Water Supply per Person (1995) (m ³ /person/year)	1,050
Degree of river fragmentation	High
Dams (>15m high) in Basin	37
Dams (>150m high) in Basin	1
Dams (>60m high) under Construction	1



Biodiversity Information and Indicators

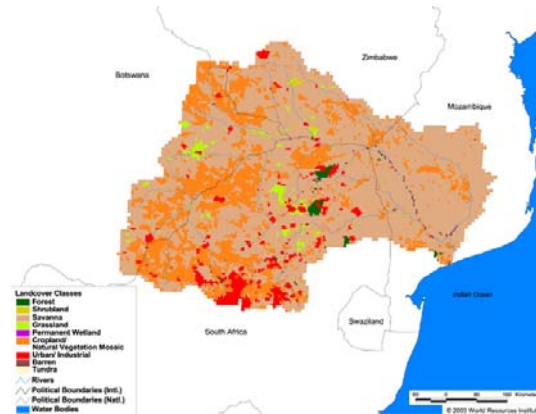
Number of Fish Species	24
Number of Fish Endemics	7
Number of Amphibian Species	42
Number of Ramsar Sites	2
Number of Wetland-Dependent Important Bird Areas	7
Number of Endemic Bird Areas	2
Protected Area	4.7



A06 Limpopo

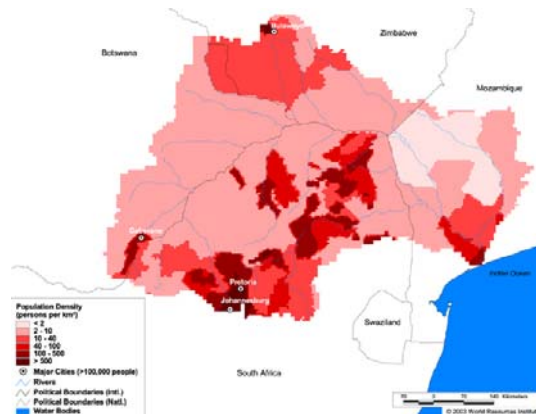
Land Cover and Use Variables

Forest Cover	0.7
Grassland, Savanna and Shrubland	67.7
Wetlands	2.8
Cropland	26.3
Irrigated Cropland	0.9
Dryland Area	82.5
Urban and Industrial Area	4.5
Loss of Original Forest Cover	99.0



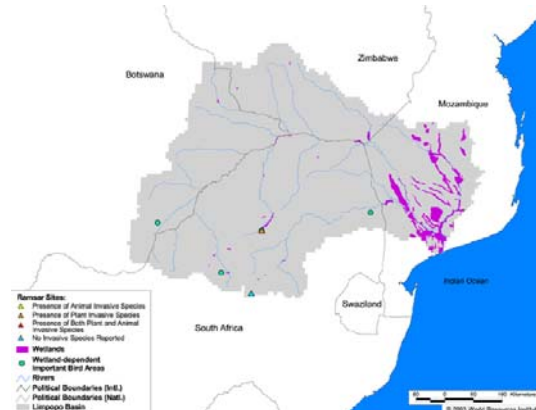
Basin Indicators

Basin Area (sq. km.)	421,123
Average Population Density (people per sq. km.)	32
Large Cities (>100,000 people)	4
Water Supply per Person (1995) (m ³ /person/year)	716
Degree of river fragmentation	High
Dams (>15m high) in Basin	25
Dams (>150m high) in Basin	0
Dams (>60m high) under Construction	0



Biodiversity Information and Indicators

Number of Fish Species	57
Number of Fish Endemics	2
Number of Amphibian Species	46
Number of Ramsar Sites	2
Number of Wetland-Dependent IBAs	4
Number of Endemic Bird Areas	3
Protected Area	8.1

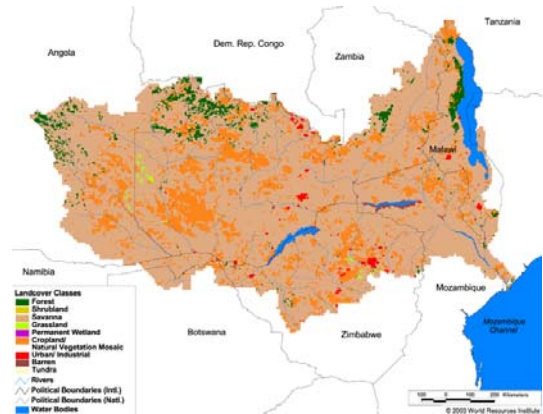


A20 Zambezi

State of the Environment Zambezi Basin 2000: <http://www.sardc.net/imercsa/zambezi/zambezi2000/summary/> Zambezi River Authority <http://www.zaraho.org.zm/>

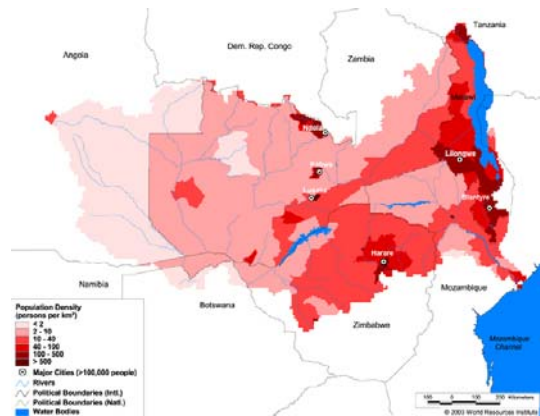
Land Cover and Use Variables

Forest Cover	4.0
Grassland, Savanna and Shrubland	72.0
Wetlands	7.6
Cropland	19.9
Irrigated Cropland	0.1
Dryland Area 3	1.9
Urban and Industrial Area	0.7
Loss of Original Forest Cover	42.8



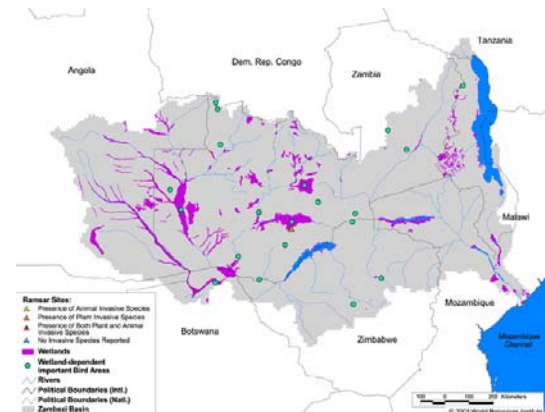
Basin Indicators

Basin Area (sq. km.)	1,332,412
Average Population Density (people per sq. km.)	18
Large Cities (>100,000 people)	6
Water Supply per Person (1995) (m ³ /person/year)	>10,000
Degree of river fragmentation	High
Dams (>15m high) in Basin	12
Dams (>150m high) in Basin	1
Dams (>60m high) under Construction	0
Dams (>15m high) on Main Stem of River	2
Dams (>150m high) on Main Stem of River	1



Biodiversity Information and Indicators

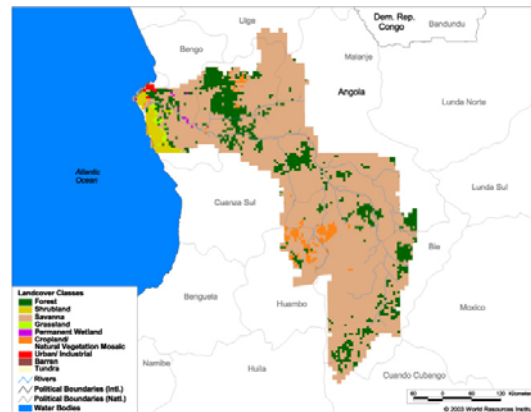
Number of Fish Species	122
Number of Fish Endemics	25
Number of Amphibian Species	141
Number of Ramsar Sites	1
Number of Wetland-Dependent IBAs	21
Number of Endemic Bird Areas	3
Protected Area	7.9



A03 Cuanza

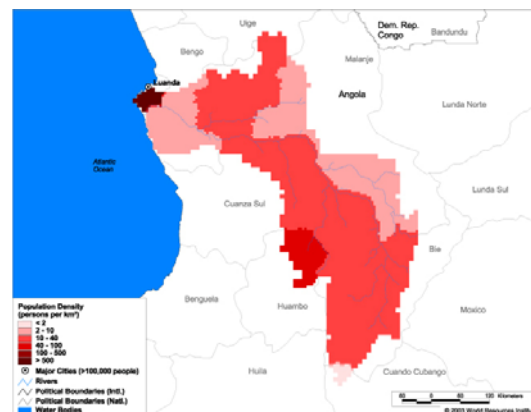
Land Cover and Use Variables

Forest Cover	16.2
Grassland, Savanna and Shrubland	79.6
Wetlands	2.1
Cropland	2.8
Irrigated Cropland	0.0
Dryland Area	8.7
Urban and Industrial Area	0.3
Loss of Original Forest Cover	-



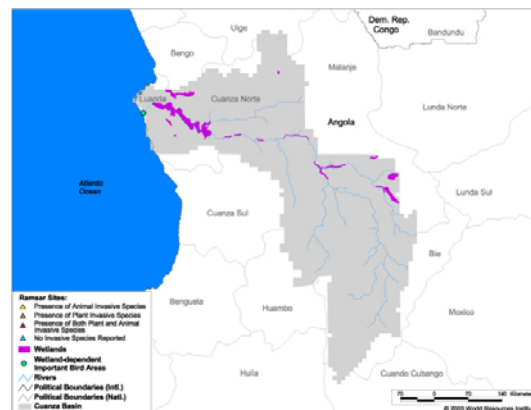
Basin Indicators

Basin Area (sq. km.)	149,688
Average Population Density (people per sq. km.)	23
Large Cities (>100,000 people)	1
Water Supply per Person (1995) (m3/person/year)	17,126
Degree of river fragmentation	Medium
Dams (>15m high) in Basin	2
Dams (>150m high) in Basin	0
Dams (>60m high) under Construction	0
Dams (>15m high) on Main Stem of River	2
Dams (>150m high) on Main Stem of River	0



Biodiversity Information and Indicators

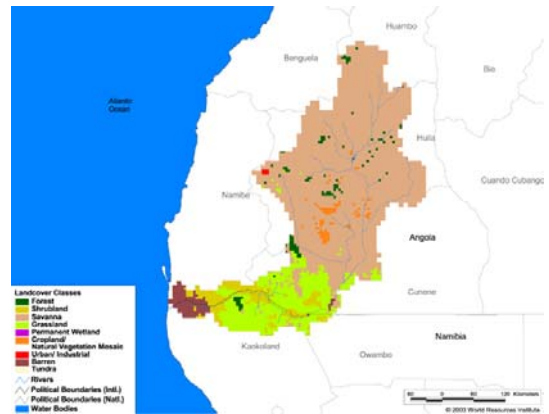
Number of Fish Species	-
Number of Fish Endemics	-
Number of Amphibian Species	43
Number of Ramsar Sites	0
Number of Wetland-Dependent IBAs	1
Number of Endemic Bird Areas	-
Protected Area	-



A04 Cunene

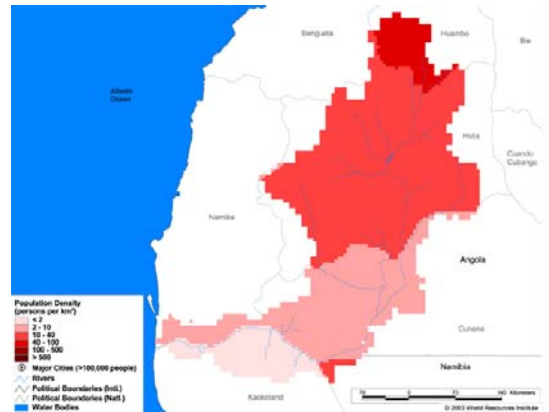
Land Cover and Use Variables

Forest Cover	3.3
Grassland, Savanna and Shrubland	90.9
Wetlands	2.9
Cropland	2.6
Irrigated Cropland	0.1
Dryland Area	30.9
Urban and Industrial Area	0.1
Loss of Original Forest Cover	-



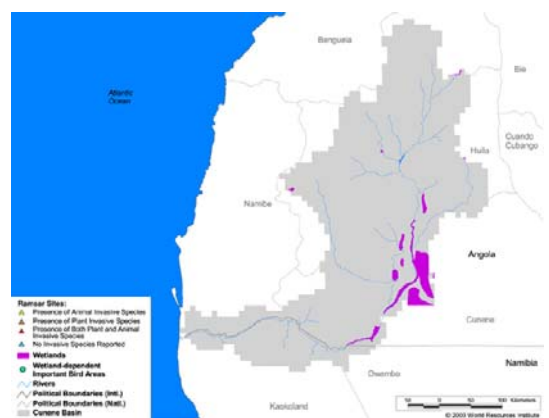
Basin Indicators

Basin Area (sq. km.)	109,832
Average Population Density (people per sq. km.)	10
Large Cities (>100,000 people)	0
Water Supply per Person (1995) (m ³ /person/year)	13,216
Degree of river fragmentation	-
Dams (>15m high) in Basin	2
Dams (>15m high) in Basin	0
Dams (>60m high) under Construction	0
Dams (>15m high) on Main Stem of River	2
Dams (>150m high) on Main Stem of River	0



Biodiversity Information and Indicators

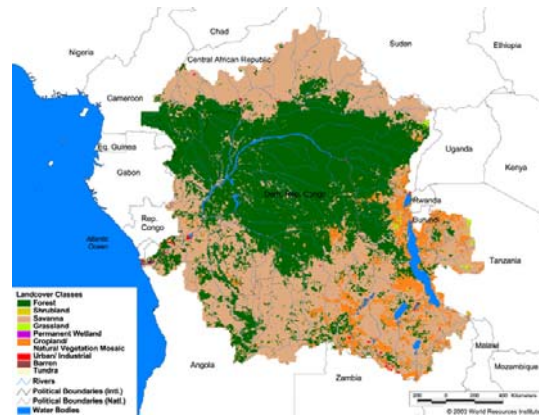
Number of Fish Species	-
Number of Fish Endemics	-
Number of Amphibian Species	45
Number of Ramsar Sites	0
Number of Wetland-Dependent IBAs	0
Number of Endemic Bird Areas	-
Protected Area	-



A02 Congo

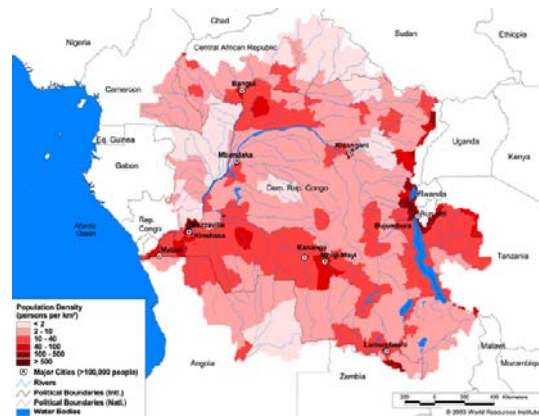
Land Cover and Use Variables

Forest Cover	44.0
Grassland, Savanna and Shrubland	45.4
Wetlands	9.0
Cropland	7.2
Irrigated Cropland	0.0
Dryland Area	0.2
Urban and Industrial Area	0.2
Loss of Original Forest Cover	45.8



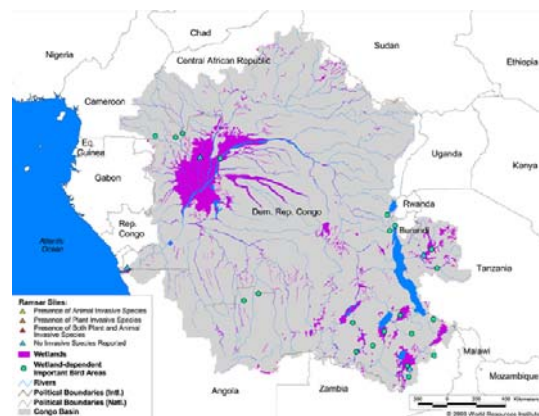
Basin Indicators

Basin Area (sq. km.)	3,730,881
Average Population Density (people per sq. km.)	15
Large Cities (>100,000 people)	18
Water Supply per Person (1995) (m ³ /person/year)	22,752
Degree of river fragmentation	Medium
Dams (>15m high) in Basin	11
Dams (>150m high) in Basin	0
Dams (>60m high) under Construction	0
Dams (>15m high) on Main Stem of River	6
Dams (>150m high) on Main Stem of River	0



Biodiversity Information and Indicators

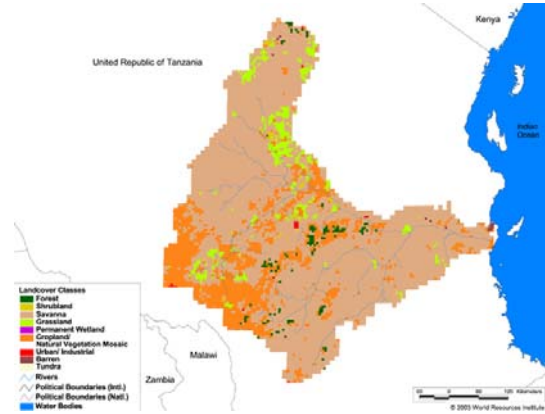
Number of Fish Species	700
Number of Fish Endemics	500
Number of Amphibian Species	227
Number of Ramsar Sites	4
Number of Wetland-Dependent IBAs	21
Number of Endemic Bird Areas	6
Protected Area	4.7



A15 Rufiji

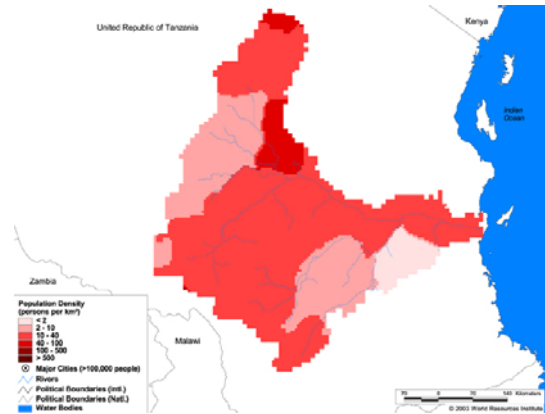
Land Cover and Use Variables

Forest Cover	2.1
Grassland, Savanna and Shrubland	77.4
Wetlands	7.8
Cropland	19.7
Irrigated Cropland	0.1
Dryland Area	20.4
Urban and Industrial Area	0.2
Loss of Original Forest Cover	-



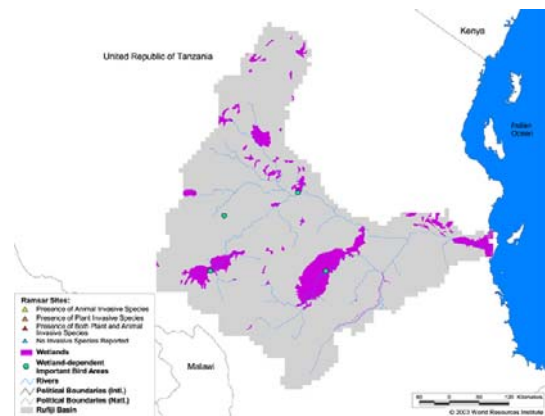
Basin Indicators

Basin Area (sq. km.)	204,780
Average Population Density (people per sq. km.)	21
Large Cities (>100,000 people)	0
Water Supply per Person (1995) (m ³ /person/year)	6,466
Degree of river fragmentation	Low
Dams (>15m high) in Basin	-
Dams (>15m high) in Basin	-
Dams (>60m high) under Construction	0
Dams (>15m high) on Main Stem of River	-
Dams (>150m high) on Main Stem of River	-



Biodiversity Information and Indicators

Number of Fish Species	-
Number of Fish Endemics	-
Number of Amphibian Species	80
Number of Ramsar Sites	0
Number of Wetland-Dependent IBAs	4
Number of Endemic Bird Areas	-
Protected Area	-



Appendix C. Scope of Work

A. Background

The Regional Center for Southern Africa (RCSA) is developing a Strategic Plan for FY 2004 – FY 2010. The RCSA's Concept Paper for this Strategic Plan was reviewed by USAID/Washington on January 30, 2003. As a result of this review, the RCSA was authorized to proceed to develop a Strategic Plan with interventions in the following areas:

- Enhanced Southern African Competitiveness in Global Markets;
- A More Integrated Regional Market;
- Reduced Corruption in Southern Africa;
- Improved Democratic Governance;
- Enhanced Regional Food Security;
- Water Resource Management;
- Reduced Regional Impact of HIV/AIDS Through Multi-Sector Response;
- U.S.-Southern African Development Community (SADC) Engagement; and
- Southern Africa Enterprise Development Fund.

The review also authorized RCSA to treat gender, HIV/AIDS, anti-corruption, conflict, and public-private partnerships as cross-cutting themes and issues across the portfolio. USAID/Washington requested RCSA to consider how best to consolidate these areas of involvement into a more limited number of strategic objectives and special objectives in finalizing the Strategic Plan.

Sections 118(e) and 119(d) of the Foreign Assistance Act (FAA) require country-level strategic plans to conduct an Environmental Analysis that addresses: (a) the actions necessary to conserve biological diversity; (b) the actions necessary to achieve conservation and sustainable management of tropical forests; and (c) the extent to which the actions proposed meet the needs thus identified. While this analysis is not mandatory for regional strategic plans that cover multiple countries, the RCSA recognizes that the protection of the environment and wise management of the natural resource base are absolute requirements for successful development programs. During the concept paper parameters review, the RCSA therefore agreed to conduct an Environmental Analysis. Section 117 (Environment and Natural Resources) of the FAA dictates that operating units implement their programs with an aim towards maintaining (and restoring) natural resources upon which economic

growth depends, and to consider the impact of their activities on the environment. The legal requirements of the FAA are reflected in the USAID Automative Directives System (ADS), Chapter 204 (Environmental Procedures), which outlines procedures and policies for the application of the Code of Federal Regulations, Title 22 (Foreign Relations), Chapter II (Agency for International Development), Part 216 (Environmental Procedures), or 22 CFR Part 216. Further, 22 CFR 216.5 requires USAID operating units to conduct their development assistance programs in ways that are sensitive to the protection of endangered or threatened species and their critical habitats.

In translating the intent of the above legal requirements into a practical strategic planning approach, the ADS provides a priority-setting framework for USAID Missions to use in determining environmental threats and opportunities. The priority-setting process is intended to guide the setting of environmental strategic objectives, as well as to inform strategic objectives in other sectors.¹

B. Objectives

The objectives of this purchase order/task order are to:

- Perform an Environmental Threats and Opportunities Assessment (ETOA) within the RCSA's geographic and proposed programmatic scope of responsibility;
- Identify potential negative environmental impacts of
- Proposed activities and recommend appropriate mitigation measures;
- Identify options to enhance the quality of the environment;
- Ensure compliance with the environmental provisions of the FAA; and
- Produce an Environmental Annex to the RCSA Strategic Plan.

C. Tasks

The Contractor shall perform the following tasks to produce the outputs and deliverables in paragraph D below:

1. Review the following background documents:

- RCSA Concept Paper for the FY 2004 – FY 2010 Strategic Plan;
- the Strategic Planning Parameters Cable (February 2003);
- preliminary results frameworks for the FY 2004 – FY 2010 Strategic Plan;

¹ ADS 201.3.8.2 underlines that the "Environmental Analysis ... is not the same as the Environmental Review described in ADS 201.3.12.3 c [and fully defined in ADS 204 and 22 CFR 216, the Agency's Environmental Procedures]. The latter is a Federal requirement for the obligation of funds. Given the interrelated character of environmental issues, Operating Units may wish to save time by conducting the Environmental Analysis and the Environmental Review during the development of the Strategic Plan. Given, however, that Environmental Reviews often require relatively detailed knowledge about planned

activities, it may not always be possible to conduct the Environmental Review during strategy development.” The RCSA will initiate the Environmental Review during the activity planning stage, immediately following approval of the Strategic Plan.

Other related products developed by the results framework working groups;

- ADS 201.3.8.2 (Environmental Analysis) and ADS 204
- (Environmental Procedures);
- 22 CFR Part 216;
- FAA Sections 118(e) and 119(d);
- Minimum Information Requirements for the ETOA (attached);
- And Illustrative Table of Contents for the ETOA (attached).

2. Review, synthesize, and analyze country-level analyses of environmental threats and opportunities to identify and document common issues and themes in the Southern Africa region.

3. Review and analyze REDSO/ESA’s analysis of environmental threats and opportunities, with a focus on Southern African countries included in this analysis.

4. Review RCSA’s proposed strategic objectives, special objectives, and program support objectives from an environmental perspective to identify environmental threats and opportunities, including potential impacts on climate and on issues identified in FAA sections 117, 118, and 119.

5. Review, synthesize, and analyze available information on institutions that are responsible for governing the implementation of regional and international environmental agreements to determine the extent to which the implementation of these agreements helps to: (a) achieve environmental sustainability; (b) mitigate negative development impacts; and (c) prevent degradation and/or achieve restoration of tropical forests and endangered species (biodiversity).

6. Consult (primarily by e-mail, telephone, and fax) with RCSA environmental experts, their counterparts in USAID bilateral missions in the region, at REDSO/ESA, and in USAID/Washington, and with a sample of environmental experts in the Southern African region to identify environmental threats and opportunities, including potential impacts on climate and on issues identified in FAA sections 117, 118, and 119.

7. Identify opportunities to go beyond basic compliance to positively influence the conservation of tropical forests, biodiversity, and water resources and improve the sustainable management of natural resources in the region.

D. Deliverables

1. Draft Report – Environmental Threats and Opportunities: Not later than 20 working days after receiving CTO comments on the research questions, the Contractor shall submit to the CTO one (1) electronic copy of a draft report (not to exceed 50 pages, excluding annexes) that examines environmental threats and opportunities inherent in the RCSA’s proposed strategic framework and incorporates or addresses tropical forestry and biodiversity concerns, in accordance with ADS 201.3.8.2, ADS 204, 22 CFR Part 216, and Sections 117-118 of the FAA. A list of minimum information requirements and a sample outline are attached. A bibliography of all literature reviewed, with complete and correctly formatted citations, shall be included as an annex. The draft report shall be submitted on IBM-compatible 3.5 inch diskette or as an e-mail attachment, using Microsoft Word 97/2000 word processing software and Microsoft Excel 97/2000 spreadsheet software, in English. Electronic documents shall be formatted for size A4 paper. The CTO shall provide comments on this draft report within 3 working days.

2. Second Draft Report – Environmental Threats and Opportunities: Not later than 6 working days after receiving CTO comments on the first draft report, the Contractor shall submit to the CTO one (1) electronic copy of a second draft report (not to exceed 50 pages, excluding annexes) that examines environmental threats and opportunities inherent in the RCSA’s proposed strategic framework and incorporates or addresses tropical forestry and biodiversity concerns, in accordance with ADS 201.3.8.2, ADS 204, 22 CFR Part 216, and Sections 117-118 of the FAA. A bibliography of all literature reviewed, with complete and correctly formatted citations, shall be included as an annex. The report shall be submitted on IBM-compatible 3.5 inch diskette or as an e-mail attachment, using Microsoft Word 97/2000 word processing software and Microsoft Excel 97/2000 spreadsheet software, in English. Electronic documents shall be formatted for size A4 paper. The CTO shall provide comments on this draft report within 3 working days.

3. Draft Environmental Annex: Not later than 6 working days after receiving CTO comments on the first draft report, the Contractor shall submit to the CTO one (1) electronic copy of a draft Environmental Annex (not to exceed 20 pages) that summarizes the findings and recommendations of the Environmental Threats and Opportunities Analysis. The draft Environmental Annex shall be submitted on IBM-compatible 3.5 inch diskette or as an e-mail attachment, using Microsoft Word 97/2000 word processing software and Microsoft Excel 97/2000 spreadsheet software, in English. Electronic documents shall be formatted for size A4 paper. The CTO shall provide comments on this draft Environmental Annex within 3 working days.

4. Final Report – Environmental Threats and Opportunities: Not later than 5 working days after receiving CTO comments on the second draft report, the Contractor shall submit to the CTO one (1) electronic copy of a final report (not to exceed 50 pages, excluding annexes) that examines environmental threats and opportunities inherent in the RCSA’s proposed strategic framework and incorporates or addresses tropical forestry and biodiversity concerns, in accordance with ADS 201.3.8.2, ADS 204, 22 CFR Part 216, and Sections 117-118 of the FAA. A bibliography of all literature reviewed, with complete and

correctly formatted citations, shall be included as an annex. The report shall be submitted on IBM-compatible 3.5 inch diskette or as an e-mail attachment, using Microsoft Word 97/2000 word processing software and Microsoft Excel 97/2000 spreadsheet software, in English. Electronic documents shall be formatted for size A4 paper.

5. Final Environmental Annex: Not later than 5 working days after receiving CTO comments on the draft Environmental Annex, the Contractor shall submit to the CTO one (1) electronic copy of a final Environmental Annex (not to exceed 20 pages) that summarizes the findings and recommendations of the Environmental Threats and Opportunities Analysis. The Environmental Annex shall be submitted on IBM-compatible 3.5 inch diskette or as an e-mail attachment, using Microsoft Word 97/2000 word processing software and Microsoft Excel 97/2000 spreadsheet software, in English. Electronic documents shall be formatted for size A4 paper.

E. Recommended Skill Mix

The Contractor is requested to propose a team (ideally including at least one regional expert) that collectively has the following skill mix:

- Knowledge of USAID requirements for environmental analyses as part of the strategic planning process;
- Previous experience with conducting environmental analyses, environmental threats and opportunities assessments, and/or Initial Environmental Examinations (IEEs) for USAID;
- Demonstrated expertise in assessing development programs for impacts on environment and tropical ecosystems;
- Strong background and experience in tropical forestry, biodiversity, and natural resources management and conservation, ideally in a developing country context;
- In-depth knowledge of Southern African policy and legal frameworks governing environmental management; and
- Expert knowledge of environmental programs and issues in Southern Africa. Team members shall have at least an MBA, MA, MS or equivalent degree in a relevant field and ten years of relevant work experience, of which no less than five years must have been spent working in a developing country context.

F. Level of Effort and Timing

The estimated level of effort for this assignment is 80 workdays (size and composition of team to be proposed by the Contractor), starting on or about April 18, 2003, and ending no later than June 30, 2003.

G. Reporting Relationships

Performance of work will be subject to the written technical direction of the CTO. The Contractor shall consult with the CTO on at least a weekly basis, either in person or by e-mail or phone, to apprise the CTO of progress. The Contractor shall liaise closely with the Mission Environmental Officer (MEO) on technical issues related to the ETOA; however, all deliverables and services required shall be inspected and accepted by the CTO.

Minimum Information Requirements for the ETOA

- History of environmental issues and actions and the socioeconomic setting, especially as related to agriculture, tropical forestry, and biological diversity;
- Climate, geography, ecosystems, and natural resource maps of the country (over a period of years if possible);
- A list of endangered and threatened species, both flora and fauna, if known;
- A list of economically important species;
- A list of socially important species;
- Information on protected areas and parks, including maps, environmental changes, and local participation;
- The legislative and policy environment, level of government action and commitment, capacity of public institutions to respond to environmental problems, the use of legislation to govern conservation and natural resources use, and the presence of a NEAP process;
- Significant threats to tropical forests and biological diversity;
- Previous and ongoing in-country research (for the countries in the region) on tropical forestry and biological diversity, including
- Economic assessments if available;
- Programs and actions of PVOs, NGOs, and other donors;
- USAID's actions and plans; and
- Bibliography.

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Appendix D. References and Resources

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