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South Africa Environment and Climate Change Analysis[1]

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This Environment and Climate Change Analysis was carried out as a brief desk study in May 2008. In line with the Swedish cooperation development goal the document aims to summarize the key issues pertaining to environment and climate change facing South Africa, related to poverty reduction and economic development.

In order to address these issues, five main questions are discussed:

1. Which are the Key Issues regarding Environment and Climate Change, causes of Key Problems and Opportunities?
2. What are the Effects of the Key Environmental and Climate Change Problems?
3. What are Key Actors doing to manage the Key Environmental and Climate Change Problems?
4. How and to what extent are the Responses to the Environmental and Climate Change Problems and Opportunities implemented and followed-up?
5. What are the implications for Sweden, including issues for consideration?

Introduction

Although South Africa is classified as a middle income country, still over 30% of the population live in poverty. The country includes highly diverse climatic zones, natural resources are unevenly distributed and water scarcity is a binding constraint to economic growth. Polluted water and air represent main challenges in the urban areas. Droughts, soil degradation and decertification negatively affect agricultural production and threaten food security which mainly affects the rural poor. Climate change is likely to exacerbate many of these environmental issues and pose new challenges. As both an industrialised and developing country South Africa faces a twofold set of environmental challenges. The country is both highly vulnerable to several environment-related risks (droughts, rising resource costs and resource scarcities, local pollution etc.) as well as the largest greenhouse gas emitter in Africa.

South Africa has made significant progress in the environmental management area during the last decade. The country has increased attention to environmental fiscal reform, cleaner production, energy efficiency, and renewable energy. Despite this there have been increasing pressures on the country's resource base and several environmental indicators have deteriorated.

[1] This Environmental and Climate Change Analysis was written at the request of Sida, Swedish Embassy, Pretoria (att: Anders Rönquist) by Emelie Dahlberg and Anders Ekbom at Sida Helpdesk for Environmental Economics, University of Gothenburg as part of Sida-EEU's institutional collaboration on environmental economics and strategic environmental assessment. Comments are welcome and can be sent to Emelie.Dahlberg@economics.gu.se and/or Anders.Ekbom@economics.gu.se

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1. Key issues regarding Environment and Climate Change, causes of Key Problems and Opportunities

Key environmental problems and their causes

Water resources – availability and quality: In the semiarid South Africa water availability (scarcity) is one of the key limits for development. Rainfall is unevenly distributed with the lowest levels in the northern and western regions. The country's available freshwater sources are under stress as both water quality and quantity is declining. Agricultural irrigation accounts for about 62% of South Africa's total water requirement. To meet the growing demand for water to industrial and population centres in RSA, water is transferred from the Lesotho highlands. At present many water resources are polluted by industrial effluents, domestic and commercial sewages, acid mine drainage, agricultural runoff and litter. The estimated population growth and rise in domestic use will increase water demand by over 50% to 2030. Thus, water supply will be a major constraint on the future-socio economic development of the country.[2] Although rivers and dams supply most of South Africa's water need, groundwater is particularly important in rural and arid areas. Groundwater supplies over 9 million people with water.[3] Difficulties in quantifying groundwater recharges make a precise assessment complicated. In some areas there has been over-abstraction of groundwater. Data is urgently needed on usage and recharge rates, to ensure sustainable use.

Land degradation: Degradation of vegetation and soil are widespread problems in South Africa. More than 90% of the land surface is within a desertification risk area[4] highly vulnerable to droughts. Wind and water erosion are major causes of soil degradation. Alien plant invasion is one of the most critical environmental issues and an important cause of vegetation degradation and losses of land productivity. Soil degradation is severe in most communal croplands, grazing lands and settlements. Over 80% of the land area is used for agriculture. The rapid population growth and inappropriate government policies in the past have encouraged cultivation in unsuitable areas and the use of poor agricultural methods to produce sufficient food.[5] Overcrowding of land in some areas and unsustainable land use practices put increasing pressure on South Africa's terrestrial resources. Lack of basic services such as electricity contributes to increased land degradation and desertification[6]. This threatens sustained supply of ecosystem services, household food security, rural livelihoods and biodiversity. Mining and coal burning industries (primarily for electricity generation) cause acidification and pollution of soils. Large areas (approximately 1.2 million ha) have been deforested primarily in Limpopo, KwaZulu-Natal, and Eastern Cape as a result of clearing of trees for cultivation, settlement and use of non-forest and forest products.

Loss of biodiversity and ecosystem services: South Africa is rich in flora and fauna and is home to some of the world's most spectacular terrestrial, aquatic and marine ecosystems. In South Africa loss of biodiversity is a serious problem. 34% of the terrestrial ecosystems, 82% of the main river ecosystems and 65% of South Africa's marine zones are threatened. Human activities such as cultivation, plantation forestry, dams, urban and industrial development, overexploitation in forests and grasslands and poaching cause loss and degradation of natural habitats. This impedes the functioning of several key ecosystems and reduces diversity and

[2] EU, 2007
[3] Department of Environmental Affairs and Tourism, 2006
[4] EU, 2007
[5] EU, 2007
[6] For example, where there is no electricity wood is harvest for energy causing deforestation (particularly in areas of Limpopo, KwaZulu-Natal, and Eastern Cape).

population of flora and fauna species. Further, alien invasive species are spreading at a rapid pace. Wetlands are essential in a semi-arid, water scarce country like South Africa. Estimations indicate that 50% of the wetlands have been destroyed due to building of dams, burning and overgrazing, invasive alien species and inappropriate land management. The country's high biodiversity provides an important basis for economic growth, local employment and poverty reduction, and underpins important industries such as fishing, agriculture and tourism. Also, the ecosystem provides vital services to people, e.g. wetlands purify waters and control floods, plants remove pollutants from air and soil supports agriculture.

Air pollution: Air quality is generally worsening with high sulphur dioxide (SO_2) and particulate matter (PM_{10}) concentrations due primarily to (coal) fuel burning within householdS, and within the industrial and power generation sectors. Emerging air pollution issues are also closely associated with the expanding transportation sector. Air pollution from domestic fuel burning in urban areas have been estimated to account for about 70% of all respiratory hospital admissions and 75% of all estimated premature mortalities.[7] (For more information on impacts on health see section below.)

Climate Change[8]: South Africa is a large contributor to climate change as well as a potentially very vulnerably to its effects. Country-specific projections are still uncertain, but it is estimated that climate change will seriously add to South Africa's existing environment-related stresses (mentioned above), particularly water scarcity, land degradation and biodiversity loss. Regarding adaptation and coping with climate change it is generally true that good public health, access to technology and societal organisation are important determinants of a county's adaptive capacity. In South Africa, the health sector, maize production, plant and animal biodiversity, water resources, and rangelands are recognized as areas of highest vulnerability to climate change. Ecosystem services play a central role for adaptation as well as mitigation of climate change. For instance, mangrove forests protect coastal zones against weather-related catastrophes and reducing deforestation is a cost-effective way of reducing CO_2 emissions.

In the UNFCC National Communication[9] key cross-sectional adaptation options that link the various sectors is been identified; i) Improved National Disaster Co-ordination and Management, ii) Education and Raising Awareness on potential effects of climate change. Sustain conservation strategies. Climate change awareness raising campaigns in order to facilitate the adoption of water use efficiency and concervation ethics. Develop predictive early warning models. Early warning systems, risk and disaster management are essential and should constantly be developmed and refined. Crop diversification.

Opportunities

Sustainable natural resource use and reduced pollution offers important opportunities for sustainable economic growth and poverty reduction.

[7] Department of Environmental Affairs and Tourism, 2005

[8] Climate projections, adaptation and mitigation challenges are described under a separate heading in the document, and are only briefly addressed in this section.

[9] Government of South Africa, 2000

Water: Potential alternatives for increasing water resource supply include desalinisation of seawater, importation of water from the Zambezi River and towing of icebergs. However these alternatives are not currently cost-effective and underscores the pressing need to improve water conservation activities and put additional effort and resources in enhanced water demand management. Opportunities which have been suggested are to promote more reuse of treated sewage water, mining water or waster water from various industries. Other opportunities are to improve collection of bills among existing water users, increase cost-efficiency of water use within sectors and municipalities, partly by optimizing water tariffs according to real demand, marginal cost and marginal benefit of water use among users.

Energy: South Africa has great potentials to develop wind and solar energy. According to the Eskom, North Cape outside Cape Town has some of the best solar cell potential in the world. However, commitment to develop these energy sources is weak compared to coal and nuclear power stations. (see section on Energy below)

Ecotourism: South Africa has world class biodiversity and ecosystems. Although South Africa has developed its tourism industry over the last two decades there are still potentials to develop ecotourism, particularly finding ways to increase the involvement of local communities, increase local rent collection and diffusion onto local development activities and investments in public local services, and combine nature-based tourism with culture-based tourism. Such developments would benefit local employment, ownership, income-generation and poverty reduction, and maintain precious environmental resources.

2. Effects of the Environmental Problems

Impacts on Poverty (Vulnerability, Security, Opportunity)
Approximately 43% of South Africa's 47 million people lives in rural areas and depends on natural resources for their livelihood.[10] Over 34% of the total population lives on less than $2 a day.[11] Income inequality[12] is among the highest in the world and the unemployment rate is over 24%[13]. The Human Development Report 2007/2008 ranks South Africa 121th out of 177 countries in terms of the Human Development Index. Poverty reinforces people's dependence on natural resources and makes them more vulnerable to environmental threats such as polluted water, degraded land and indoor air pollution. In South Africa many people are live and work outside of the formal sector. Rural dwellers and people affected by HIV/AIDS are particularly vulnerable to a deteriorating environment.[14]

Land rights is one of the most important social and political issues in South Africa today. 28% of the population are estimated to live in the former homeland areas where land rights often are unclear or contested and the system of land administration is distorted. On private farms workers and their families do not enjoy tenure security. It is estimated that nearly one million

[10] Department of Environmental Affairs and Tourism, 2005
[11] http://hdrstats.undp.org/indicators/24.html
[12] The Gini-coefficient for South Africa is 0.578. *Gini Coefficient* is the summary measure of inequality in the distribution of expenditure. A Gini-coefficient equal to 0 represents total income equality and a Gini-coefficient equal to 1 indicates total income inequality.
[13] CIA Factbook; World Bank, 2008a; World Development Report 2008.

[14] Department of Environmental Affairs and Tourism, 2005

people have been evicted from farms since 1994. Most (77%) of them are women and children with little education and work experience.[15]

Rural land redistribution is advancing at a very slow pace. Just over 5% have been redistributed, well short of the 30% target. Although the government has built over 2.4million urban homes since 1994, most of the poorest people of the population still remain in poorly developed peri-urban areas or slum areas deprived of safe water and sanitation, reliable energy supply, waste management etc. As a result many of the cities and towns still reflect the geographic and racial separation of Apartheid.[16] African Development Bank and OECD states that "the poor remain de facto excluded from the economic opportunities in the cities".

Access to electricity varies between urban and rural households with 80% and 50% respectively.

Impacts on Economic Development

In a global comparison South Africa is an emerging market with a rich supply of natural resources. It is the world's largest producer of platinum, gold, chromium. The mining sector is the main source of export and contributes to almost 8% of GDP. Tourism is the fastest growing economic sector currently contributing to over 8% of the GDP, with estimations of reaching 12% of GDP by 2010 when South Africa hosts FIFA World Cup.[17] In 2006/2007 agriculture fell 8% while the forecast for 2007/2008 agricultural season is a slight improvement due to good and timely rainfall. Agriculture, forestry and fishing represent approximately 3% of the country's GDP. Although a minor share of GDP, these sectors are important source of income for the poor and local employment.

Efforts to maintain agricultural productivity in view of a growing population, increasing input prices and land degradation constitute a major challenge to South Africa. Food production per capita is decreasing and agricultural and food imports are increasing. It is estimated that the country's net agricultural income is overstated with 35% as the environmental costs are not currently included in the accounts.[18] The ecological footprint per person in South Africa is higher than the global average (2.8 hectares per person in South Africa compared to global average of 2.3 hectares per person). The country's official savings amount to around 14% while the Adjusted National Savings are estimated to be just above 0%[19]. This is a worrying indication of non-sustainable use of several natural resources. Moreover, key environmental degradation such as the costs of net depletion of fish stocks, soil capital and essential ecosystem services are missing. This indicates that the country's natural capital, on which much of South Africa's growth depends, is declining.

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[15] Department of Environmental Affairs and Tourism, 2005

[16] AfDB/OECD, 2008

[17] Chief executive officer of South Africa Tourism, http://www.sa2010.gov.za/news/070822tourism.php

[18] Department of Environmental Affairs and Tourism, 2005

[19] Adjusted National Savings (ANS) identifies a country's real savings by adjusting the official savings (gross domestic savings) with the use (depletion) of natural resources, certain global environmental costs (CO_2 emissions), depreciation of buildings and infrastructure, and education investments. ANS identifies the economic value of these changes and reflects the country's development from a sustainability perspective.

Adjusted Net Savings for South Africa is approximately 0.3. World Bank, 2007

Regarding food prices and food security, South Africa has experienced the highest rate of food-price inflation since January 2003. From April 2007 to April 2008 the increase in the Consumer Food Price was almost 16%. These rising costs will most likely continue to threaten household food security, especially among the poor. The increased grain prices are mainly due to increased demand on international and domestic grain stocks, while the increased vegetables prices are largely attributed to climate variability and unfavourable rainfall.

Impacts on Health

Safe drinking water and sanitation are vital for good health. In South Africa, 88% of the population has access to improved water sources (73% of the rural population and 99% of the urban population). Only 65% of the total population has access to improved sanitation. Access to sanitation varies between 49% and 79% in rural and urban areas respectively. The rapid urbanisation has resulted in informal shanty towns springing up near cities resulting in poor waste management causing water pollution and health risks. Surveys on this issue are currently underway.[20]

WHO estimates almost 14 000 deaths annually due to diarrhoea caused by polluted water and bad hygiene, and indoor- and outdoor-air pollution (see table below). People affected by indoor air pollution can be expected to stay or even increase since the dependence on wood fuel and charcoal for energy will continue.[21] The same can also be expected for outdoor air pollution as trends show expansion of vehicle transport and industries. This is likely to be particularly challenging for the largest cities.

	Water Sanitation & Hygiene		**Indoor air pollution**		**Outdoor air pollution**	
Country	Diarrhoea deaths/year	Diarrhoea DALYs/1000 capita/ year	Deaths/year	DALYs/1000 capita/year	Deaths/year	DALYs/1000 capita/year
Botswana	300	6.6	200	2.6	<10	0.0
Namibia	700	13	200	2.6	<100	0.2
South Africa	**11 900**	**9**	**1 000**	**0.5**	**1 000**	**0.2**
Mozambique	26 900	47	9 700	16	900	0.6

Source: WHO, Department of Public Health, 2007

With AIDS as the leading cause of death among adults in South Africa, HIV/AIDS remains the main health challenge.[22] In a greater context of livelihood strategies and vulnerability it is accelerating the breakdown of social structures and farming systems in rural areas, causing higher levels of poverty, and increases vulnerability and food insecurity. The virus aggravates unemployment and inequality. HIV/AIDS pandemic is a major threat to social and economic development. The estimated number of HIV-infected people rose from 3.8 million in 1999 to 5.5 million in 2006, representing an estimated adult prevalence rate of 21.5%.With South Africa's high rate of HIV/AIDS, adequate water supply, sanitation and nutrition are of utmost

[20] Department of Environmental Affairs and Toursim, 2005
[21] Biggs et al, 2005
[22] AfBD/OECD, 2008

importance as people infected with HIV/AIDS have weakened immune systems and are more vulnerable to infectious diseases.[23] Food insecurity exacerbates the spread and impact of HIV/AIDS as it increases migration and therefore increases the risk of infection exposure. [24]

Climate Change

Climate change is a complex issue for South Africa. The country is highly vulnerable to the impacts of climate change and at the same time the country is ranked as one of the 12 countries with highest CO_2 emissions (ranked higher than e.g. France, Australia and Brazil)[25].

Expected impacts: Climate change could severely impact the already scarce water resources of South Africa. For the next 50 years, climate change projections indicate less rainfall in the western parts of the country and higher temperatures, mainly in the interior. This will lead to changes in water availability which will significantly affect agricultural production, most likely very negatively. Areas that will become drier include the Western Cape, the Northern Cape, and North West and Limpopo province. As a result land degradation in these areas is predicted to increase which would reduce agricultural productivity, constrain livelihoods and reduce or degrade biodiversity. Higher surface temperatures are projected to increase threats to public health by increased spread and incidence of malaria, and increased incidents of infectious and respiratory diseases. Floods and drought are predicted to become more frequent.[26] Increased incidence of droughts would obviously put more pressure on all systems. Increased rainfall intensity and flooding can destroy or reduce the production potential of agricultural systems, as well as infrastructure for transport and irrigation.[27]

Climate change is also predicted to have an impact on sea levels. Sea levels have risen by approximately 1,2mm per year over the last three decades. This trend is expected to accelerate in the future: recent estimates suggest a 41 cm rise by 2080[28]. As sea level rises there will be increased coastal erosion, higher levels of saltwater going (intrusion) into estuaries and groundwater, and greater vulnerability to extreme storms and floods.

Adaptation to Climate Change: A general view is that an effective response to climate change must combine *adaptation* to manage the unavoidable, with *mitigation* to avoid the unmanageable.[29] Wealth, access to technology and societal organisation are important determinants of a county's adaptive capacity. In South Africa the health sector, maize production, plant and animal biodiversity, water resources, and rangelands are recognized as areas of highest vulnerability to climate change.[30] In the UNFCC National Communication (Government of South Africa, 2000) key cross-sectional adaptation, options that link the various sectors are identified: i) improved national disaster co-ordination and management, ii) education and awareness raising on potential effects and adaptation opportunities pertaining to climate change. In addition it is necessary to facilitate increased water use efficiency, development of early warning modelling and public systems. Early warning systems, risk and disaster risk management (prevention, preparedness), and adjustment of farming technologies and input choices, including crop diversification.

[23] Biggs et al, 2005
[24] Biggs et al, 2005
[25] World Bank, 2008
[26] Department of Environmental Affairs and Tourism, 2005
[27] Biggs et al, 2005
[28] Department of Environmental Affairs and Tourism, 2005
[29] World Bank, 2008b
[30] Government of South Africa, 2000

Mitigation of Climate Change and Energy: South Africa's high greenhouse gas (GHG) emissions per capita are mainly due to its dependence on, and extensive use of, coal for cheap electricity. As much as 92% of South Africa's electricity comes from burning coal. This is largely due to the fact that South African electricity generated from coal is among the cheapest in the world (Visagie et al, 2006). The country's extensive coal energy consumption is expected to continue in the short to medium term. Household and small scale industries consume most of the SADC regions energy use, followed by the transport sector.

Eskom[31] is planning to construct five new nuclear power stations in the south and southwest parts of South Africa. Despite the climate debate, Eskom's plan is to upgrade coal powered stations and to build new coal power stations. One of Eskom's arguments is that the South African mines still hold major uranium and coal supplies. However, there are great socio-economic and environmental concerns connected to these activities, which need to be taken into account properly. In addition, water shortage is a constraint.

In South Africa biomass energy accounts for about 12% of total energy consumption, and despite strenuous efforts at electrification of informal settlements and rural areas, about half the population still use wood as a domestic energy source.[32]

3. What are Key Actors doing to manage the Environmental Problems?

National actors: Department of Environmental Affairs and Tourism (DEAT) is formally the central environmental policy-making body in South Africa. DEAT has the main responsibility for tourism, fishing industry and environmental management. Various policy instruments are used to address the key environmental issues of the country. Regarding legal reform, the 1998 National Environmental Management Act (NEMA) is the first framework piece of environmental legislation for that purpose.[33]

Other important government institutions are the Department of Water Affairs and Forestry, which is the protector of the nation's water and forest resources. The Department of Minerals and Energy (DME) is the key government institution in the energy sector, which formulates and implements energy policies and oversees associated institutions such as the National Energy Regulator. Due to its mandate over key natural resources like minerals and coal obviously DME is a key Department for addressing sustainability issues (maintenance of the nation's natural capital) and for preventing or abating pollution. The Committee for Environmental Co-ordination (CEC) is the primary statutory body for integrating environmental issues in different resource based departments and at different levels of government.[34] DEAT and the Department of Foreign Affairs are the lead government departments behind the National Strategy for Sustainable Development (NSSD).

The trend of environmental governance in South Africa is to decentralize environmental management functions from national to provincial and local levels. Constraints in terms of lack of skilled personal and capacity at both provincial and local levels impedes countrywide

[31] The electricity sector is dominated by the state-owned national utility Eskom, which owns and operates more than 90% of generation assets, the whole transmission grid, and a significant portion of the distribution industry, especially in rural areas (Wrinkler et al, 2007).
[32] Biggs et al, 2005
[33] Government of South Africa, 2006
[34] Department of Environmental Affairs and Tourism, 2005

enforcement and implementation of environmental policies. In order to promote sustainable development at the local level, each municipality is required to develop a 5-year Integrated Development Plan (IDP)[35] which can be seen as focal points for the implementation of NSSD.

During the last decade, laws and strategies have been developed that focus on key environmental areas such as biodiversity, air quality, protected areas, urban and rural development, and waste and disaster management. Since 1997, developments that could result in significant environmental degradation require Environmental Impact Assessment (EIA) process. Strategic Environmental Assessment (SEA) is increasingly used at higher levels (program, plan, policy) of planning and decisionmaking. In a global comparison South Africa is one of the leading nations in methodology development and practicing SEA in strategic decisionmaking (Dalal-Clayton and Sadler, 2005).

Regional and sub regional actors: South Africa plays an active role within Africa regionally, sub-regionally within South African Development Community (SADC) and internationally. The country is a key member of the African Union (AU), supporting growth and development through the AU's New Partnership for Africa's Development (NEPAD).[36] The South Africa's vision for NEPAD is to continue to support and champion sustainable development by reconciling sustainable natural resource use, and economic and social development, subject to the principal aim of eradicating poverty and attaining the Millennium Development Goals.[37] South Africa is a full member and is playing a key role in the region within the South African Development Community (SADC), particular on issues such as integrated water management and biodiversity conservation.[38]

International actors: On development, the European Union (EU/EC; the Commission and Member States) is the major donor representing approximately 70% of all Official Development Assistance (ODA) to South Africa. The European Commission in South Africa does not have a programme devoted exclusively to the environment, as this has not been one of the priorities in the previous country strategy papers or Multi-Indicative Plans. However, the European Commission is seeking ways to intensify its environment dialogue with South Africa.

Current UNEP projects in South Africa include: i) *Indicator Strategy for State of the Environment Assessment and Reporting for Southern Africa;* the objective of the project is to identify and agree on the indicators to be used in State of the Environment reporting in the SADC region, and ii) *Centre for Environmental Information and Statistics*; the objective of this project is to establish a national facility in South Africa to make environmental information available to decision-makers and the general public. The main areas of work will include state of the environment reporting, indicator development and geographic information systems (GIS). It is envisaged that the Centre will be involved in UNEP project activities in the region.[39]

[35] Government of South Africa, 2006
[36] EU, 2007
[37] Government of South Africa, 2006
[38] EU, 2007
[39] EU, 2007

Environment is the largest area, in monetary terms, of the World Bank's engagement in South Africa. There is an active Global Environment Facility (GEF) portfolio of seven projects. The World Bank plans to continue to support South Africa's conservation of its biodiversity and its fight against land degradation and desertification. Further, land reform and agriculture is a longstanding area of engagement for the World Bank in South Africa, and one in which significant work has been done in partnership with various SA Government agencies.[40]

Besides state actors there are a number of private companies and civil society organisations relevant to the environment, including mining companies (such as De Beers, Anglo Platinum and Sasol), and NGOs, e.g. WWF and the World Conservation Union (IUCN). The South African Power Pool was created in 1995 aiming at establishing a common market for electricity in the SADC region. Other donors active in environmental issues include Danida which focus on alternative and renewable energy production and supply.[41]

4. How and to what extent are the Responses to Environmental problems implemented and followed-up?

Water: Despite the existence of quite comprehensive water legislation[42] the implementation of the policies has not been adequate or sufficient. The problems particularly relate to lack of access, sanitation and sustainability. The White Paper articulates a "some-for-all" policy where the responsibility for local water supply rests with the local governments.[43] However, due to general budgeting problems within municipalities, a lack of government funding to assist with infrastructure installation, and low capacity at local levels, much of the water-related infrastructure is of low quality; very limited progress has been made in integrating water and development planning.[44] South Africa defines water both as an economic good and as a basic human right. This could entail a dilemma as full-cost recovery of water supply should prevail alongside free provision of a baseline water quantity to the poor segments of the population. A water reallocation reform is ongoing.

Biodiversity: DEAT holds the primary responsibility and authority for biodiversity conservation countrywide, but this responsibility is shared with other national departments including the Department of Water Affairs and Forestry and the Department of Agriculture. The Biodiversity White Paper of 1997 sets out goals, strategies, and priorities for conservation, sustainable use, and equitable benefit-sharing. The National Environmental Management Act (1998) introduced national legislation on biodiversity use and conservation.

Land degradation: The current land reform program faces substantial challenges for dealing effectively with and implementing South Africa's land reform policy, which has fundamental implications for human well-being in the country. Among agricultural smallholders there is also a need to increase productivity by increasing efficiency of inputs, optimize crop mix and apply (more) soil and water conservation technologies. Here, the private sector and extension services have potential roles to play, with better advice, larger access to inputs and output

[40] World Bank, 2007a

[41] EU, 2007

[42] The water legislation include: a White Paper on a National Water Policy for South Africa (1994), a Water Service Act (1997), and a National Water Resources Strategy,

[43] Council on Hemispheric Affairs; http://www.coha.org/2008/05/01/alternative-strategies-south-africa%E2%80%99s-water-policies/

[44] Department of Environmental Affairs and Tourism, 2005

markets, credits, insurance schemes, and more integration of research results. A potential way to deal with land degradation, sustain the soil and increase productivity is to apply more conservation farming based on agro-diversity (promoting biodiversity in land husbandry).

Air pollution: South Africa is responding to its air pollution challenges in various ways. These include legislative reform, revision of ambient air quality limits, proactive planning by local authorities, and sector-specific controls. Some progress is made but the challenges are daunting and there is a need to seriously address the increasing trends of urban air pollution due to the cumulative effects of increased transport, urban expansion and industry development.

Climate change: In 2004, DEAT launched the *Climate Change Response Strategy*, which outlines South Africa's responses associated with climate change. A first *National Climate Change Convention* was held in 2005. National and international scientist together with policy-makers developed material for South Africa's Second National Communication under the United Nations Framework for convention on Climate Change (UNFCCC).

In terms of mitigation a few small scale South African projects under the Clean Development Mechanism (CDM) aim to reduce use of energy from fossil fuels (such as coal). One example is the Kuyasa Housing project in the Western Cape, where solar water heaters, compact fluorescent light bulbs, and celling insulation are being used in low-income housing. Other initiatives include the first commercial windfarm for grid generation at Darling in the Weastern Cape, an increased number of solar-power systems in rural clinics and schools, introduction of hybrid cars, and the future development of Pebble Bed Modular Reactor at Koeberg (Earthlife Africa and other civic and environmental groups express opposition to the plant).

Energy: The first *Energy Efficiency Strategy* for South Africa was published in 2005. Its vision is to contribute towards affordable energy for all, and to minimize the damaging effects of energy use upon human health and the environment. The strategy's national target is to improve energy efficiency with 12% by 2015. A White paper on renewable energy was approved in 2003 with the target to produce 10 000 Gwh renewable energy by 2013. Production will mainly come from biomass, solar, and small-scale hydroelectric plants. The recent energy crisis (2007/2008) is partly caused by the country's strong economic growth, rapid urbanisation and industrialisation and the mass electrification program. All these factors worked in conjunction to cause major power supply shortages. The government and Eskom are working to bring South Africa's electricity supply and distribution system back into balance. In January 2008, the Department of Minerals and Energy and Eskom released a new policy document, "*National Response to South Africa's Electricity Shortage*".

On the supply-side, Eskom introduced (in January 2008) "load shedding", planned rolling blackouts based on a rotating schedule, in periods where short supply threatens the integrity of the grid. Demand-side management has focused on encouraging consumers to conserve power during peak periods in order to reduce the incidence of load shedding. The problems are indicators of a systemic failure to balance energy supply and demand; it underscores the importance of (i) upgrading sustainable energy production and use, (ii) that poverty and equity concerns are integrated in the energy supply and demand management, and (iii) that increased use of sustainable energy sources are promoted and that reliance on coal as the major source of energy is gradually phased out.

5. Implications for Sida

Issues for Sida to consider

Below are some tentative areas and issues for Sida to consider in the process of developing a selective cooperation strategy for South Africa. It should be noted that the desk study is brief and the issues below are suggestive and by no means comprehensive.

- Water is becoming increasingly scarce and threatens the country's growth prospects and livelihood conditions. One opportunity for water conservation is to promote reuse of treated sewage water or mine water by industry.

- Although South Africa is strong in a regional comparison, supporting research and education environmental issues and climate change is badly needed. At the moment decisions are being taken based on insufficient and inappropriate data and analyses. Actor-based collaboration between universities or research organizations may be investigated for specific project son e.g. efficient policy instruments for enhanced environmental management (using prices (taxes, subsidies), information disclosure, legal reform, command and control for cost-effective natural resource and pollution reduction).

- Improving and increasing the use of environmental technologies are central to address the challenges of climate change as well as reducing local air and water pollution. There is a need to reduce energy consumption at household level, encourage renewable energy programmes, reduce energy demand in industry, increase energy efficiency and develop efficient public transport systems. Therefore, promotion of solar water heaters (SWHs) and biodiesel may be renewable energy sources that could make a significant contribution towards poverty alleviation, reducing coal dependence and pollution, and improving the general welfare.

- Development eco-tourism is an opportunity to increase income and support environmental sustainability. South Africa has rapidly developed the tourism sector but in view of the upcoming FIFA World Cup 2010 and the increased interest likely following it will increase the opportunities to combine income generation and environmental management through expansion of nature-based tourism.

- The land reform process is crucial for more equitable land distribution, improved tenure security leading to i.e. higher investments rates and better land management. It might therefore be worthwhile to investigate if supporting a sound land tenure policy and supporting the land reform process would be of interest to South Africa.

- Urban planning: Growing urbanisation has increased the need for resources such as water and energy, and services such as waste management. Balancing ecological constraints with socio-economic needs is a huge challenge for all SA's cities. Here improved urban planning for sustainable development is a tool and approach which is under-used and much needed in most of the larger cities. Cross-sectoral approaches are necessary. Sida may wish to solicit interest and opportunities for improved public transportation, water and energy use, waste management and sanitation.

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Appendix I: National legislation with implication for environmental management function

Department	Act	Objective
Agriculture	The Conservation of Agricultural Resources Act (No. 43 of 1983)	To conserve the natural agricultural resources of the Republic by, amongst other things, maintaining the production potential of the land and combating and preventing erosion.
	The Fertilizers, Farm Feeds, Agricultural Remedies Act (No. 36 of 1947)	To provide for the registration of fertilizers, farm feeds, agricultural remedies, stock remedies, sterilizing plants, and pest control operators; to regulate or prohibit the importation, sale, acquisition, disposal, or use of fertilizers, farm feeds, agricultural remedies, and stock remedies.
	Agricultural Pests Act (No. 36 of 1983)	To provide for measures for control over plants and for the prevention of plant diseases (agricultural pests).
	The Genetically Modified Organisms Act (No. 15 of 1997)	To provide for measures to promote the responsible development, production, use and application of genetically modified organisms; to ensure that all activities involving the use of genetically modified organisms (including importation, production, release, and distribution) shall be carried out in such a way as to limit possible harmful consequences to the environment.
Water Affairs and Forestry	The National Water Act (No. 36 of 1998)	To ensure the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner.
	The Water Services Act (No. 108 of 1997)	To provide a regulatory framework for local authorities to supply water and sanitation services in their respective areas.
	The National Forest Act (No. 84 of 1998)	To provide for sustainable forest management and the restructuring of the forestry sector.
	The National Veld and Forest Fire Act (No. 101 of 1998)	To provide for measures to prevent and combat veld, forest, and mountain fires throughout the Republic.
	The Mountain Catchment Areas Act (No. 63 of 1970)	To provide for the conservation, use, management and control of land situated in mountain catchment areas.
Land Affairs	The Development Facilitation Act (No. 67 of 1995)	To introduce measures to facilitate and speed up the implementation of reconstruction and development programmes; it lays down general principles governing land development throughout the Republic.
Minerals and Energy	The Minerals and Petroleum Resources Development Act (No.28 of 2002)	To provide for the equitable access to and sustainable development of the nation's mineral and petroleum resources.
	The Nuclear Energy Act (No. 46 of 1999)	Sets out the Minister's responsibilities regarding source material, special nuclear material, restricted material, radioactive waste, and the storage of irradiated nuclear fuel.
	The Mine Health and Safety Act (No. 29 of 1996)	To provide for the identification of hazards and the elimination, control, and minimization of risks relating to health and safety in mines.
Health	The Hazardous Substances Act (No. 15 of 1973)	To provide for the control of substances that may cause injury, ill-health, or death to human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature, or by the generation of pressure.
Arts and Culture	National Heritage Resources Act (No. 25 of 1999)	To introduce an integrated and interactive system for the management of national heritage resources.

Source: Department of Environmental Affairs and Tourism, 2005

Appendix II: Multilateral Environmental Agreements

Multilateral Environmental Agreement	Status
Agreement for the Implemen tation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	Ratified: June 2003 (acceded)
Agreement on the Conservation of Albatrosses and Petrels	Signed and ratified: 6 November 2003
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)	Acceded to and ratified by May 1994; came into force: 3 August 1994
United Nations Framework Convention on Climate Change	Signed: 15 June 1993, 27 August 1997 (although DEAT submission to parliament indicates 1994) Ratified: 29 August 1997 Kyoto Protocol: acceded to in July 2002
Convention on Biological Diversity	Ratified: 2 November 1995.
United Nations Convention to Combat Desertification	Acceded to: June 1994; signed: 1995; ratified: 30 September 1997
Convention on International Trade in Endangered Species of Wild Life and Fauna	Ratified: 1973; came into force: October 1975
Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade or the 'Rotterdam Convention'	Signed: September 1998; ratified: 4 September 2002
Convention on the Conservation of Antarctic Marine Living Resources	Acceded to: September 1980; ratified: 1982
Protocol for the Protection of the Ozone Layer (Montreal Protocol)	Acceded to: 15 January 1990; ratified: 15 January 1990 (the Montreal Amendments to the Protocol (1997) have yet to be ratified)
Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention	Ratified: 10 July 1997
Stockholm Convention on Persistent Organic Pollutants	Signed: 21 May 2001; ratified: 4 September 2002
Southern African Developing Countries Protocol on Fisheries	Signed: 14 August 2001; ratified: July 2003
Southern African Developing Countries Protocol on Wildlife Conservation and Law Enforcement in the Southern African Development Community	Signed: 18 August 1999; ratified: October 2003
Transfrontier Conservation Areas Initiative	
- Ai-Ais/Richtersveld Treaty	Signed and ratified: 1 August 2003
- Kgalagadi Transfrontier Park Agreement	Signed and ratified: 12 May 2000
- Greater Limpopo Transfrontier Park Treaty	Signed and ratified: 9 December 2002
- Lubombo Transfrontier and Resource Area (Lubombo Protocol)	- Lubombo Transfrontier and Resource Area (Lubombo Protocol) Signed and ratified: 22 June 2000

Source: Department of Environmental Affairs and Tourism, 2005