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Climate change implications for Southern Africa: a gendered perspective

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Introduction

Southern Africa's ability to adapt to climate change is dependent on resources at its disposal, both financial and human. The region's geographical and socio-economic diversity, as well as a wide range of political differences, pose a challenge to its ability to effectively respond to climate change. Nevertheless, there are some common regional concerns that warrant a generalised approach to climate change implications for the region. These include population dynamics, low levels of development, poverty, poor infrastructure, the effects of HIV and AIDS, over-reliance on external donor funding, dependence on the natural resource base, natural catastrophes such as floods and drought, and high levels of environmental degradation.

In many ways the region has managed to focus attention on the role of women in development. Many educational projects focusing on the girl child have been implemented as a result of the UN's call for the recognition and advancement of women in all aspects of development. Some modest advances have also been made in the areas of health and education, particularly, but much more still needs to be done in other spheres. One of these is energy and climate change: the international debate on energy policy has not given enough attention to the gender-differentiated impacts of energy and climate change (Wamukonya & Skutsch 2001). Given the disparities in economic and social standing across gender, it is important to consider the regional implications of climate change from the perspective of gender. This view takes into account the general needs of the region, but at the same time it requires disaggregation of the need of high risk groups to ensure that targeted interventions are made to ensure the full participation of these groups in both the making of policies on climate change and the implementation of adaptation and mitigation strategies. This approach emphasises the need to contextualise international energy policies to the local level, where the gender dynamics become more apparent, and where the impact is much more devastating.

As highlighted in the IPCC Third Assessment Report (TAR) report, regions differ as far as the impact of climate change is concerned, and Africa will suffer the most. The high dependency on climate sensitive sectors, such as agriculture, make Africa and the stakeholders in this sector, most of them women, particularly vulnerable (World Bank 1998).

While there is general agreement that the region as a whole is vulnerable to climate change, it is also true that some countries are more vulnerable than others and that, within these countries, some population groups are at greater risk than others . On a global level, the formation of the Least Developed Countries (LDCs) group is a significant indicator of the non-homogeneity of developing countries. Thus, when considering adaptation, it is important to disaggregate the different population groups on regional and national levels, since the ability to adapt differs accordingly.

This paper explores some of the potential impacts of climate change , possible adaptation strategies, and whether or not, given the socio-economic and political situation of the region, progress can be made towards ensuring that the region survives climate change. The paper highlights critical issues in international policies and

strategies and their implications for the Southern African region, with a particular focus on climate change as it relates to gender.

Why gender and climate change?

The main rationale for differentiating between men and women as far as climate change is concerned, is the different roles that the two sexes play in society, and hence the different ways in which they are affected by energy policies in general, and climate change in particular (White, 1994). While the biological differences between males and females are undoubtedly obvious and universally acknowledged, the different ways in which the impact of climate change will affect men and women still need to be fully acknowledged, and taken into account in the design and implementation of response measures.. The differences in male and female rolesindicate that climate change will impact on men and women differently, based on their different roles in the community, and on their levels of access to resources.

While gender analysis in energy has gained prominence because of the ever-increasing attention being paid to energy issues, the same cannot be said for gender and climate change (Rukato, 2001). The lack of attention to this arena can be attributed to many factors. First, the gender and energy debate is just beginning to make inroads into mainstream energy policy-making. This debate, however, has only been limited to issues of access to energy, health, cooking stoves, research, and national energy policy-making. Secondly, the gender and energy debate has not kept pace with international developments in climate change. Thirdly, the links between gender and energy, and climate change and its adverse impacts, have not been well articulated both inhe international arena and at regional and national levels. Finally, the climate change agenda is being set at the international level, and has therefore not addressed local imperatives such as gender and climate change. It is therefore up to regional governments and stakeholders to start highlighting the gender-differentiated dimension of climate change. This paper is but one of the many regional and international efforts now being made to highlight the gender and climate change imperatives in regional and international energy and environmental governance.
In order to fully contextualise the gender and energy debate in Southern Africa, it is important to provide a detailed overview of regional socio-economic and geographical characteristics of the region. These characteristics determine the level at which the region will be able to effectively deal with climate change both in the short and in the long term.

The climate change debate

The international climate change debate recently had a severe setback with the announcement by President Bush in March 2001 of the USA's intention to withdraw from the Kyoto Protocol. It is difficult to predict the direction the debate will take in future. The path adopted is nevertheless likely to affect the ability of the Southern African Development Community (SADC) to adapt to climate change. Historically, the climate change debate picked up pace in 1990, when the Intergovernmental Panel on Climate Change (IPCC), the leading scientific body on climate change, released its first report, which concluded that there was discernible evidence that anthropogenic greenhouse gases (GHGs) were having a detrimental effect on global warming. The IPCC also concluded that there existed no-regrets mitigation measures that could minimise the rate of global warming induced by people.

This report was the basis upon which the United Nations Framework Convention on Climate Change (UNFCCC) was negotiated in Rio de Janeiro in 1992. The UNFCCC became the first international legal instrument on climate change, and started operations in 1994. By September 2000, 186 parties had ratified the Convention, and only the Democratic Republic of Congo (DRC) among the SADC countries had not done so (UNFCCC 2001). Amongst other things, the UNFCCC called for the reduction of GHGs, based on the common but differentiated responsibility principle. Developed countries were called upon to take the lead, as they are historically responsible for the largest share of emissions.

In 1997 it was concluded that developed countries had not made enough progress in reducing their emissions to 1990 levels, and that commitment to quantified emissions reductions was needed. A meeting to discuss mechanisms for quantified emission targets was held in Berlin in 1997 (The Berlin Mandate). Draft recommendations for the reduction of emissions were made, and later discussed at the Conference of the Parties (COP3) in Kyoto in December 1997. This draft, now known as the Kyoto Protocol, was adopted for discussion. Negotiations for the ratification and entry into force of the Kyoto Protocol are still underway. By 20 July 2001, 84 parties had signed the Protocol and 37 of these had ratified.

In late 2000 the IPCC released its Third Assessment Report, which further highlighted the potential impacts of climate change, and warned that these impacts are actually greater than had been predicted in 1995. These impacts will have a devastating effect on human life, and Africa is singled out as the most vulnerable region. A summary of the predicted impacts of climate change on the SADC region is presented in Box 1 below.

Box 1: Possible climate change impacts on Southern Africa

Drought: The recent drought in southern Africa is an indication of what could happen as a result of climate change. The drought, which has been described as the worst in living memory, represented a mild version of what could happen if the CO_2 in the atmosphere was to double.

Floods: The recent floods (2000) that devastated Mozambique, South Africa and Zimbabwe, while due to climate variability, are an indication of what could happen as a result of climate change. The floods resulted in loss of life, infrastructure and biodiversity. The ripple effects of these impacts have not been identified,, and the impacts of the floods have not been quantified.

Agriculture: Rain-dependent agricultural systems will be affected, and so will food security.

Ecosystems: The drying up is expected to destroy a wide range of eco-systems, severely affecting animal populations such as elephant, buffalo and antelope. Biogenetic resources and wetlands would be destroyed. Hydroelectric generation in the region would be impaired, with the attendant economic effects, such as regional dependency on South Africa.

Political disputes could arise out of conflicts over scarce resources.

Populations of disease vectors such as malaria-carrying mosquitoes will multiply rapidly, and their distribution over geographical areas would spread to areas currently without them. (According to the IPCC, high-lying, malaria-free cities such as Harare and Nairobi could also risk being invaded by malaria-bearing mosquitoes. There have already been reports of malaria extending to higher altitudes in Ethiopia, Rwanda and Tanzania as a result of the warming of night-time temperatures (WWF 2000).)

A decrease in rainfall would reduce the area which can support plantations, and the growth rate of trees.

If sea levels rose, coastal zones, fisheries and biodiversity would be adversely affected by climate change.

Adapted from Rukato, 1999

Regional approaches to climate change

SADC Policy on Environment and Climate Change

In 1981, the Council of Ministers of SADCC entrusted the government of Lesotho with the co-ordination of regional activities on Soil and Water Conservation and Land Utilisation (SWCLU). In 1988 a SWCLU unit was set up within the Ministry of Agriculture, Co-operatives and Marketing of Lesotho. In 1991 the Council of Ministers broadened the mandate of the SWCLU to include SADC environmental coordination and changed the Sector's name to SADC Environment and Land Management Sector (ELMS). This incorporates the biodiversity and desertification conventions. Given its environmental portfolio, it might be expected that the SADC ELMS would be a natural home for matters of climate change.

Recently, SADC sought to elevate the portfolio of climate change in its development programmes by expanding the mandate of SADC ELMS to include climate change. Under this mandate, SADC ELMS will co-ordinate those aspects of other technical administrative units that are related to climate change. It will also initiate regional activities concerning climate change, and it should be expected to participate more actively in international negotiations, putting forward a regional position for SADC. But ELMS lacks the human and financial resources to implement this additional mandate (Maya, 2001). To date, no additional skills and resource support has been provided to assist the expanded mandate. Given the fact that economic and sectoral policies are always adjusted on an ad hoc basis, and do not comprehensively take into account impacts on the poor and the environment, the implemention of sustainable gendered regional approaches to climate change poses a special challenge.

Generally, there is a of effective interaction and information flow between researchers and policy-makers in the region. This has resulted in regional policies and decision-making processes that are not always informed by the necessary research on their short- and long-term implications. This is evidenced by the lack of participation of the regional representatives in the UNFCCC negotiating process, and also by the limited translation and incorporation of UNFCCC objectives into national development plans. There is therefore a need to establish links between science, policy-makers, and stakeholders on national, regional, and international levels.

In the industrial sector, confederations of industry in most SADC countries have environment committees. These could provide a base for climate change programmes in industry. Most of these committees have already participated in discussions in this area, and in some cases they sit on national climate change committees.

The impacts of climate change in Southern Africa

A taste of what is in store?

The floods related to climate variability that afflicted some of the SADC countries in 2000, and the repeat performance this year, have been associated by some experts with climate change. *Could the region cope with such incidences if this is what climate change entails?* We examine the costs associated with the past occurrences and note the pivotal importance of the international community in coping with these floods. In parts of Malawi, Mozambique, Zambia and Zimbabwe, severe floods have disrupted the lives of about 960 000 people. There has been loss of human and animal life, and damage to infrastructure, housing and crops. An outbreak of cassava mosaic virus has seriously

reduced the cassava harvest, particularly in the eastern part of the DRC, further aggravating the food problems. As a result, large quantities of food aid had to be donated to the region. The 1998 *el Niño* effect, which could also be seen as a result of climate change has caused havoc and had negative impacts on food security. It is difficult to imagine what Mozambique, for example, would have done had there been no external assistance. Over 300 000 people were adversely affected by the floods of 2000 in Mozambique, as indicated in Table 1. Prior to the floods and after five consecutive years of increasing production, Mozambique had achieved exportable surpluses of maize, estimated at 150 000 tonnes in the marketing year 1999/2000. (FAO, 2000a). These gains were eroded in a flash by the floods.

Table 1. impacts of 2000 floods in SADC
Source: FAO (2000 a; 2000b)

Mozambique	Over 300 000 people adversely affected 699 deaths Infrastructure destroyed, settlements cut off, housing damaged Government requested US$2.7 million Direct cost of the damage in the public and private sectors amounts to some US$275 million Total cost of the damage amounts to US$490 million Extensive losses of small animals, such as goats and chickens Emergency food aid for flood-affected and food deficit communities, amounting to 60 000 tonnes, needed for 650 000 people
Botswana	25 000 people affected, 4 000 homes destroyed Main roads and railways cut off in several places Damage costs: US$8.5 million
Swaziland	Loss of life and extensive damage to roads, bridges, and housing Shortages of drinking water experienced
Lesotho	Reduced cereal production.
South Africa	Loss of life and damage to housing and infrastructure 100 000 people left homeless Crop losses: over US$11 million
Angola	6 000 affected and needing food aid
Zimbabwe	Roads, bridges, dams and power lines swept away An estimated 250 000 people left homeless

The greatest challenge facing the southern African region is its capacity to adapt to climate change. In the context of the predicted impacts in the region, some adaptation measures have been proposed for research, development and implementation. A summary of these is presented in Box 2. Needless to say, the successful implementation of these adaptive mechanisms requires progressive leadership and both human and financial resources. But, given the socio-economic and political situation that exists, can the region stand up to the challenge? What follows is an analysis of the region's socio-economic and political dilemma, and of what will make or break the region in the quest to survive climate change. A gendered approach has been adopted in the analysis.

Box 2: Potential adaptation measures

Agriculture

The main changes will focus on changed agricultural management and practices, which will encompass changes in planting dates, row-spacing, planting density and cultivator choice, furrow dyking, terracing, contouring and planting vegetation, as well as counteracting the impacts of various

degrees of moisture.

Increased and improved use of irrigation systems.

Shifting to drought-resistant crops, as well as changing land uses.

Diversifying sources of income for farmers.

Disease and vectors

Improved monitoring and forecasting of disease. More attention should be paid to future prevention and monitoring activities.

Development and implementation of strategies to prevent mosquito bites, including improved access to disease control technologies.

Improved access to treatment.

Improved access to water and sanitation.

Water resources

Integrated river basin planning to improve both quality and quantity of available water.

Water conservation measures, including demand management and market-based mechanisms.

Prevention of water pollution.

Improved monitoring and forecasting of floods and droughts, and the dissemination of this information to policy-makers.

Forestry

Changes to more heat-resistant species.

Genetic engineering may be used to develop more adaptive hybrids.

Biodiversity

Biodiversity monitoring.

Changes in land use to minimise impacts on biodiversity.

Overall, the establishment of a biodiversity-monitoring network will help in identifying the most vulnerable species.

Development or improvement of National Disaster Coordination and Management.

Education and awareness-raising on the potential impacts of climate change , and possible strategies to adapt to them.

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Energy

Fuel switching.

Energy efficiency.

Regional characteristics

The SADC, formerly known as the Southern African Development Coordination Conference (SADCC), was born at the Lusaka Summit on 1st April 1980, when nine governments expressed their commitment to pursue policies aimed at economic liberation and integrated development of national economies. It was formalised through a Declaration and Treaty signed in Windhoek in 1992. The community currently has 14 member states, Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Seychelles, Mauritius, Malawi, Mozambique, Namibia, Tanzania, Swaziland, South Africa, Zambia and Zimbabwe. The region is characterised by a low-to-medium human development index. Except for the DRC and Mauritius, the member states' arable land is less than half of the individual states' total land area. The agricultural sector is dominated by a high percentage of female labour as compared with males. South Africa and Mauritius are an exception to this trend see Appendix 1 for details). Social, political and economic disparities across countries make governance within the community a challenge.

The region's geo-physical, economic, social, cultural and political characteristics also differ. Namibia and Botswana are largely desert, while the DRC is tropical. There are countries with marine and coastal zones, such as South Africa, Mozambique and Tanzania, and small island countries such as Seychelles and Mauritius. These zones are particularly important for tourism and fishing; activities in these two areas are vital for a large part of the population if they are to survive. Climate change is expected to have detrimental effects on these areas as well as on marine bio-diversity. The region also hosts seven of the LDCs[3] (Malawi, DRC, Angola, Lesotho, Mozambique, Tanzania, and Zambia). In the context of a total of 49 LDCs, seven may seem an insignificant number, but nonetheless those countries constitute half of all SADC member countries, and 70% of the total SADC population resides in them.

Though SADC has made some progress in seeking economic integration, despite the significant variations in wealth and infrastructural development across countries, there are still relatively large gaps.
Contributions to GHG emissions differ across countries, with South Africa being the largest emitter. Its per capita CO_2 emissions, registered as 8.5 tonnes per inhabitant in 1998, rival that of many Annex 1 countries (UNFCCC 2001c). Over 80% of the region's emissions emanate from the use of coal-based plants to generate electricity, which is mainly used in South Africa, despite the fact that this country generates only some 26% of SADC's total electricity (Wamukonya & Tyani, 2000). The SADC countries account for a mere 2% of global emissions but will receive an inequitable share of the suffering associated with these emissions.

Regional challenges

The largest share of the SADC population resides in rural areas, and is heavily dependent on subsistence, rain-fed agriculture. Overall, agriculture plays an important role in the economy. Agricultural productivity has been falling, however, mainly due to lower world prices and drought– recorded at US$424 per worker in 1980 and US$375 in 1990 (GCA 1999). Most of the economically active females are employed in agriculture and, owing to the rapid decline of the male population in rural areas, through increasing urbanisation and HIV AIDS, agriculture is increasingly being feminised. For example, studies carried out by FAO in Mozambique in 1998 showed that for every 100 men working in agriculture, there were 153 women (FAO 2001). In 1998 there was an average of 36.7% of the population in the region in urban areas, and the average annual increase over 1990-98 was 5% (World Bank 2001). This implies a reduction in farm labour, but also a need for increased agricultural productivity from the same farms.

If climate change were to result in floods or droughts such as those experienced in the recent past, then agricultural productivity is likely to fall further and social vulnerability would rise. Thus, the dependency on women for the livelihood of the household has risen, despite the limited opportunities for a decent living. In times of crisis, as has been evidenced by droughts and the HIV pandemic, the level of dependency on women tends to rise. It would thus follow that this would be the case if there were catastrophes caused by climate change.

[3] The criteria for LDCs are low income, weak human resources and a low level of economic diversification. This implies that these countries are particularly vulnerable to climate change, are dependants, and would also not be in a position to come to the economic rescue of their neighbours. Except Angola, all have undergone either structural adjustment programmes (SAP) or the enhanced SAP, but still remain LDCs.

The number of households headed by women has risen, with most of them being in the poorer section of society. Further, studies have shown that women heads of household tend to be less educated than their male counterparts, generally have less land to work, and even less capital and extra farm labour to work it with. With a shortage of labour and capital, these women are often forced to make adjustments to cropping patterns and farming systems. These adjustments have resulted in decreases in production and, in some cases, shifts towards less nutritious crops. Not surprisingly, these households often suffer from increased malnutrition and food insecurity (FAO 2001). With the increased privatisation in the agricultural sector, small-scale farmers, and especially poor women, are finding it particularly difficult to access inputs because of a lack of credit and the high transaction costs emanating from the disperse settlement distribution (Friis-Hansen, 2000). This has further weakened their ability to meet food needs.

It is thus obvious that these poor households are particularly vulnerable to climate change. Decreased agricultural productivity also impacts negatively on food security. Given that most poor women reside in rural areas and are economically less advantaged than their male counterparts, any further deterioration in food security as a result of climate change will have disastrous consequences.

The proportion of females to males participating in economic sectors is generally lower, though in some countries, such as Mozambique, it is almost at par. Regionally, the female-to-male ratio of participation for 1995 was on average 0.76 (World Bank 2001), which indicates that the women are important income earners. Needless to say, most of the women are employed in provision of services and agriculture-related jobs that are likely to be negatively affected by climate change. Overall, the percentage of households headed by women has been increasing; partly due to the urbanisation already referred to, and also as a result ofwar, as well as changes in social-cultural structures. Thus, dependency on women for household livelihood has risen, despite the limited opportunities for them to make a decent living.

In addition to poverty, gender and age, there are factors that influence a region's ability to adapt to climate change, the assumption being that the very old and the very young suffer most because of their inability to fend for themselves, and will need to be supported by the middle-aged group. The age dependency ratio is calculated as a ratio of dependants – ie the population under the age of 15 and over 65 – to the working-age population, which are those aged between 15 and 64 (Table 2). On average the regional level of dependency is quite high, at 0.8. This implies a high level of vulnerability to climate change. A large share of the population would not have the resources and ability to adapt to climate change.

Table 2. Age and gender structure of the population
Source: World Bank (2001); The World Factbook (2000)

	Female % of pop., 1997	% hh headed by women	Age groups as % of total pop, 1998			Age dependency ratio, 1998	National poverty headcount as % pop, 1984-97
			0-14 yrs	15-64 yrs	65+ yrs		
Angola	50,6		47,6	49,6	2,9	1	
Botswana	51		42,9	54,9	2,3	1	
DR Congo	50,6		47,4	49,8	2,7	1	
Lesotho	50,8		40,1	55,9	4,1	0,8	49
Malawi	50,7		46,3	51,2	2,5	1	54

Mauritius	50,1		25,9	67,7	6,1	0,5	11
Mozambique	51,6		44,6	51,4	3,9	0,9	
Namibia	50,2		41,8	54,4	3,7	0,8	
Seychelles	48,7		30,6	64,5	3,8		
South Africa	51,9		33,4	61,8	4,8	0,6	
Swaziland	52,1		42,6	54,8	2,7	0,8	
Tanzania	50,5		45,8	51,8	2,4	0,8	51
Zambia	50,4		46	51,8	2,2	0,9	55
Zimbabwe	50,4		41,7	55,5	2,8	0,8	26
Average	**50,7**		**41,2**	**55,4**	**3,4**	**0,8**	

It is noteworthy that a significant share of the population on which the society depends is afflicted by HIV/AIDS and will thus not be fully available to provide the necessary services. Table 3 shows that in 1997 the most productive working group, aged 15-49 years, constituted about a quarter of those with the virus in Zimbabwe and Botswana. In Namibia, Swaziland and Zambia, the share of the infected was close to a fifth. Women comprise about half of the adult population living with AIDS. The extent of the problem is even more evident from the fact that 11 of the SADC countries are listed as highly affected (UNAIDS 2001). Not only does AIDS reduce people's productivity, mainly because of a decrease in income and in available labour, and increased workload in taking care of the sick, it also significantly increases household costs .

A study done in Côte d'Ivoire revealed that households with an AIDS patient spent twice as much on medical expenses as non-AIDS households (ECA 2000). The number of infected women is rising faster than that of men. It is well documented that women perform most of the work influenced by AIDS. Overall, life expectancy has been decreasing in all the SADC countries: the 1995-2000 average in the SADC's 11 countries most affected by HIV/AIDS was 49.3 years instead of the projected 61.5 years, and this situation is expected to worsen in future (UN Population Division, 2001).

The level of national poverty in the few countries for which data is available (see Table 2) highlights the high level of vulnerability to both AIDS and to climate change. In addition, the majority of the productive group earns relatively low levels of income. A large share of household income is spent on food, implying that little is available for investing in what is needed to adapt to climate change. To aggravate the situation, this share is likely to increase as a result of climate change because of decreased food resources available from subsistence farming (IPCC 2001).

Urban dwellers consume more resources and generate more solid waste than their rural counterparts. Because of poor infrastructural development in urban areas, waste disposal and sewerage services are inadequate, which results in serious public health problems such as cholera outbreaks, which compound the problems caused by high health costs and low productivity from the already small proportion of the productive population. In 1994, 61 960 cases of cholera resulting in 4 389 deaths were reported in Angola, DRC, Malawi, Mozambique and Tanzania (WHO 1995). The higher the rate of urbanisation, the greater these problems.

Table 3. People living with HIV-AIDs, 1999
Source: UNAIDS (2001)

	Total number	Adult women	Adult women as	Adult rate (%	Life expectancy at

	0-49 yrs		% total adults	aged 15-49)	birth (yrs 1998)
Angola	160 000	82 000	49	2,78	47
Botswana	290 000	150 000	48	35,80	46,2
DRC	1 100 000	600 000	45	5,07	51,2
Lesotho	240000	130 000	46	23,57	55,2
Malawi	800000	420 000	48	15,96	39,5
Mauritius	500			0.08	71,6
Mozambique	1 100 000	630 000	43	13,22	43,8
Namibia	160 000	85 000	47	19,54	50,1
Seychelles					71
South Africa	4 200 000	2 300 000	45	19,94	53,2
Swaziland	130 000	67 000	48	25,25	60,7
Tanzania	1 300 000	670 000	48	8,09	47,9
Zambia	870 000	450 000	48	19,95	40,5
Zimbabwe	1 500 000	800 000	47	25,06	43,5
Total	**1 185 050**	**6 384 000**	**46**	**16,5**	
Average					**51.5**

In spite of the increase in death rates because of AIDS, population growth is expected to continue because of continued high fertility. In Botswana, where the prevalence of HIV is 36%, a 37% population increase is projected by 2050 and the rise for Swaziland and Zimbabwe will be 148% and 86% respectively (UN Population Division, 2001). This would result in increased demand for resources such as food. In addition, not only would the number of people exposed to the impacts of climate change be higher, but the share of the vulnerable would also rise, since the proportion of those under 15 years would be high. At the same time the older population is projected to quadruple (UN 2001); hence more facilities to enable the population to survive these impacts would be needed.

Clearly an AIDS-weakened society will have a lower chance of surviving and adapting to climate change than a healthier society.

Can the region manage the expected food security problems?

Various factors place SADC in a poor position to adapt and with a low ability to adopt a preparedness strategy. The region is experiencing key challenges which force it to focus on short-term solutions and leave little room for long-term planning and strategising. Civil strife, extreme climatic variability (floods and droughts), stressedwater resources, and global market forces, all threaten the region's food security.

Some of the SADC countries, including Angola, DRC and Tanzania, are among those listed by FAO as facing exceptional food emergencies – these are a result of civil strife and population displacement in the case of Angola and the DRC, and drought in the case of Tanzania (FAO 2001). The undue burden placed by civil strife on the regional food supply has significant implications for SADC vulnerability and its ability to adapt to climate change.

The region has suffered from occasional droughts which often leaves the affected areas without adequate food, and in need of external assistance. The period between 1985

and 1995 was disastrous for many rural communities, especially in Zimbabwe, Mozambique, southern Zambia and northern South Africa. Boreholes dried up, making it impossible to grow crops or maintain livestock herds and forcing women and children to walk further and further to collect water to meet their families' needs. The 1991/1992 drought hit particularly hard, putting more than 18 million people in 10 countries at risk of starvation. Urban dwellers were also affected. Water supplies in Zimbabwe's capital, Harare, sank to alarmingly low levels during 1995, and power shortages became commonplace. By October that year, the Kariba Dam, which produces most of the country's electricity, was running at only 14% capacity. Only the abundant rains of 1995/96 averted an energy and agricultural crisis for Zambia and Zimbabwe (WWF 2000).

In January 2001 a prolonged dry spell hit parts of Angola, Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe, and subsequent heavy rains caused flooding in low-lying areas of Malawi, Mozambique and Zambia. This is expected to result in reduced harvests, and the importation of maize from outside the sub-region could be necessary (FAO 2001). This indicates not only the continued susceptibility of the region, but its inability to implement internal solutions and its dependence on external assistance. Such droughts might escalate as a result of climate change; this, added to the increased water stress, is expected to increase the incidence of the water-borne diseases, further compounding the problems.

Food production per capita has been falling in most SADC countries (see Appendix 2.) Various factors, including the lack of appropriate inputs, intensified the further utilisation of already largely marginal land, and the decrease in land available for crop production and the increasing frequency of drastic climate variability have affected this pattern. Discussions in the preceding sections indicate that the situation is bound to worsen as these factors will be amplified by climate change.

The demand for water in the region is projected to grow by 3% annually until 2020 and the share used for irrigation is expected to rise (UNEP 1999). The majority of the poor will continue to lack access to water because of inadequate energy resources, which will inevitably increase the threat to food security and the utilisation of fragile ecosystems.

The frequency with which the region is experiencing natural disasters makes it difficult for the people, the majority of whom are poor, to adjust and to invest in sustainable adaptation measures in their longer-term planning. In fact, these calamities have caused the region to retrogress in various aspects. The level of assistance provided to the affected countries by SADC members in times of natural disasters has been limited, mainly because most of these other countries are themselves ill-placed to provide support, because of their own economic, social and political ailments. Most forms of aid have traditionally come from the international community. If the region expects to be dependent on the international community for interventions related to climate change , then it needs to be aware of the fact that there is increasing demand on this pool of resources from other parts of the globe. This implies a need to enhance self-sufficiency.

Regional economic status

Can the SADC economy withstand climate change and can it be relied on to prepare the region for the change?

Regional countries are variously placed on the economic ladder, with the upper level fixed at the UN level rating of middle-income. In terms of this ranking, Seychelles has the highest per capita GNP, about 36 times higher than that of Malawi, the country with the lowest value (see Table 4). Angola and DRC are notable, and to some extent so is Zimbabwe, for their decrease in per capita GNP over the years, while the rest of the countries experienced slight changes. Judging from the Angolan value for 1990, it is clear that war has devastating effects on the economy. Wars therefore have a strong bearing on the extent to which a country or region can prioritise climate change, as well as develop and implement effective adaptation strategies.

Table 4. GNP per capita (US$)
Source: World Bank (2001)

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Angola		840	930	600	370	150	240	270	340	320	270
Botswana	1230	2730	3050	3300	3200	3100	3360	3410	3270	3070	3240
DRC	630	220	210	200	190	160	150	130	110	110	
Lesotho	490	590	590	650	680	680	690	720	730	590	550
Malawi	190	190	230	220	230	160	160	180	210	200	180
Mauritius	1240	2430	2610	2960	3080	3180	3420	3720	3800	3590	3550
Mozambique		170	170	140	140	140	140	140	180	210	220
Namibia		1800	1930	2030	1940	2040	2160	2130	2080	1930	1890
Seychelles	2110	5070	5240	5930	6330	6440	6460	6750	6910	6710	6540
South Africa	2540	2890	3050	3320	3460	3610	3740	3770	3700	3320	3170
Swaziland	970	1200	1210	1290	1260	1220	1380	1470	1520	1400	1360
Tanzania		190	180	170	170	160	160	190	210	240	260
Zambia	630	490	390	360	380	340	340	370	370	330	330
Zimbabwe	950	920	920	750	680	650	630	710	720	640	530
Average	998	1409	1479	1566	1579	1574	1645	1711	1725	1619	1699

The GDP has been increasing in most countries (Appendix 3) and, based on the 1999 calculations, it appears that for the majority of them, services make up the largest share of the GDP, compared with agriculture and industry (Appendix 4) (World Bank 2001). Since climate change would have the most impact on the agricultural sector, the lower dependence on this sector with respect to GDP is rather a good sign. However, it is worth noting that GDP often does not capture the subsistence existence and therefore ignores the crucial role that agriculture plays in the survival of the majority of the rural population. The fact that agriculture is the most important contributor to GDP in the DRC, Malawi and Tanzania deserves mention. Given that climate change is likely to reduce agricultural productivity (IPCC 2001), these countries' GDP would suffer from climate change.

What are the options for the region?

Overseas development assistance

Can the region rely on Overseas Development Assistance (ODA) to adapt to climate change?

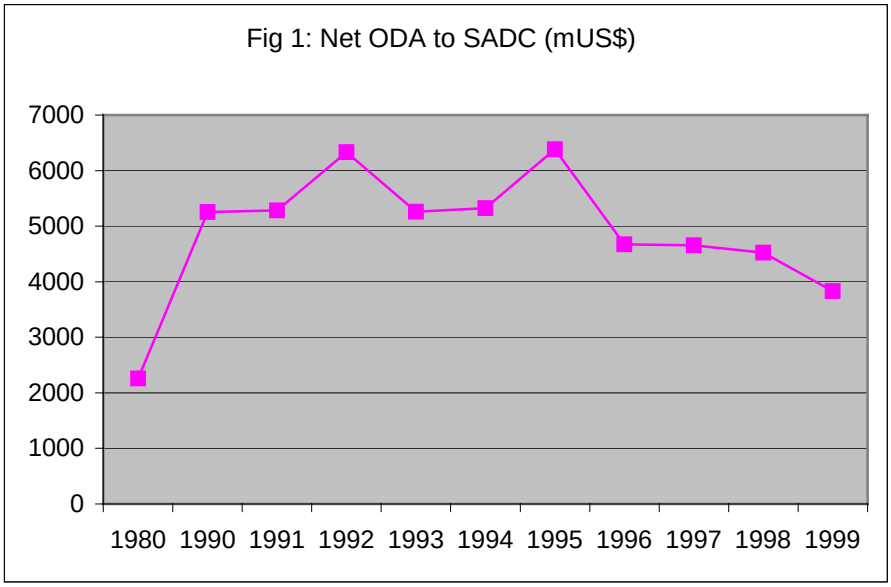
We analyse the ODA flow to various countries. From Figure 1, it is evident that the total ODA to SADC has been decreasing, although the decrease should not be construed

as an indication of lack of demand. The reduced access to ODA means that the region cannot expect to use this assistance to prepare for climate change or adapt to it..

Even after South Africa entered the ODA camp in 1994, the total ODA to the region did not increase. What actually happened is that the other SADC members had on average a smaller size of the pie than before 1994, with the larger share going to South Africa,. despite the rising regional demand for assistance. In general, countries with higher per capita GNP receive low levels of ODA s, but not necessarily lower than poorer countries (see Appendix 5). For example, South Africa gets more ODA than Lesotho, although Mozambique, which has consistently been experiencing quite low GNP per capita, has been receiving the largest amount of ODA, except in 1999.

To contexualise the issue, it is important to understand the role of ODA within the national development scenario. We examine this role by comparing the gross public investment as a percentage of GDP with ODA as percentage of GDP (see Appendix 7). The rationale for choosing these parameters is the fact that ODA is mainly used for investment in the public sector, and given that the effects of climate change are cutting across various sectors, a public-oriented approach is needed to address them. It is evident that overall ODA is an important share of public investment for the SADC region. Regionally, ODA has on average constituted 12.5% of the GDP annually. The level of dependence on ODA varies across countries. In Zambia and Zimbabwe, ODA is larger than public investment, which might imply a relatively high level of dependency on ODA for investment compared with other countries. In some of the comparatively richer countries, such as South Africa, Seychelles, Botswana and Mauritius, ODA as a percentage of GDP is much lower than the public investment. In Mozambique, ODA is a relatively larger share of the GDP compared with the other countries.

Fig 1: Net ODA to SADC (mUS$)



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Foreign direct investment

Despite the higher returns from foreign direct investment (FDI) in Africa compared to other continents, investment has been very marginal (UNCTAD, 1999). The net FDI flow to SADC was rising, but fell steeply in 1998 (see Figure 2). UNCTAD notes that Botswana, Mozambique and Namibia are among the main recipients, though Tanzania is also a good performer (UNCTAD 2000), and Angola appears to also be a leading player (see Appendix 6). However, not only is FDI a very small amount compared with GDP, but it is also predominantly in the hands of the private sector and, as such,

generally not available for public services – which is what would be required in tackling climate change. Traditionally, FDI players have been driven by a wish for quick profits and would thus not be willing to invest in climate change adaptation activities, which are likely to bear profits only in the longer term. Needless to say, the impacts of climate change will be across all sectors, and even the private sector stands to lose in the absence of timeous mitigation and adaptation measures. There is therefore an opportunity for regional governments to engage business associations such as the International Chamber of Commerce (ICC) and the World Business Council on Sustainable Development (WBCSD) more proactively to ensure that their members support local research and development of adaptation strategies and their implementation as part of business' contribution to sustainable development.

Gross domestic investment

Can the region turn to domestic investments to address climate change?

On average, the level of domestic investment in the region has remained stable at about one-fifth of the GDP (World Bank 2001). Lesotho has quite high and rising investments. Across countries, domestic investment seems to fluctuate through the years. Botswana and Tanzania have been experiencing a downward trend; in recent years, the level of investment has been below 20% of the GDP.

Since the gross domestic investment (GDI) originates from both the public and private sectors, it is worthwhile to disaggregate it to analyse the component that might be the most flexible, the public investment (GPUI) (see Appendices 7 and 8). For most countries, the total average GPUI between 1990 and 1999 is lower than the gross private investment (GPPI). This implies that there would not be a substantial amount of investment from the public sector to channel towards climate change work.
Except for Lesotho, where GPUI has been quite high, in most SADC countries this investment constitutes only a small share of the GDP. Seychelles, Mozambique and Botswana have a relatively stable GPUI above 10% of the GDP, while the bulk of the others fall are below 10% . Given that adaptation and preparedness for climate change are in the public domain, they will naturally require more public than private investment. As already noted, the levels of public investment so far are rather limited, and it is unlikely that this will increase. Hence these countries are particularly vulnerable.

On the other hand, governments could devise mechanisms to ensure that the private sector invests in minimising a country's vulnerability to the effects of climate change. This could be done through environmental regulations. However, care should be taken not to excessively burden the private sector with what should be a duty of government. If that should happen, investors will simply go where these conditions are not imposed. In this regard, we analyse the GPPI.

Private investment is highest in Angola, Seychelles and Mauritius. Notable is the fact that although Seychelles has stable public investment, the proportion is about half that of private investment. The last few years have seen an increase in private investments in Mozambique. In 1999 both Lesotho and Namibia experienced large hikes while Zimbabwe suffered a decrease of about 65% compared with the previous year. Sharp decreases have also been noted in Swaziland in 1998. These seemingly random changes in private investment tend to reflect the political situation in a given country. Needless

to say, private investment is thus an unreliable source for adapting to climate change or implementing mitigation options.

To what extent can governments realistically invest in preparedness and adaptation to climate change?

Governments across the region have been caught up in a wave of privatisation/commercialisation. The trend seems irreversible (although the recent experiences in California's power sector might influence the pace if not the approach – for details on this experience see Gupta (2001)). We examine the process of privatisation of public enterprises in the SADC as a reflection of the power within government to manoeuvre proceeds towards climate change (Appendix 9). However, without information on the total number of enterprises potentially available for privatisation, it is difficult to establish the full value of what remains within government control.

The SADC region accounts for about half of the transactions in sub-Saharan Africa (not including the four countries for which data was not available). It is notable that the countries with the highest FDI flows are also the countries in which most of the privatisation is occurring. This might indicate that FDI is not being used to add, or maybe even diversify, enterprises but is used to purchase previously government-owned enterprises. Thus it may not create substantial additional opportunities in areas such as employment or services. Given that climate change might result in job losses, particularly in the agricultural sector, it appears as if FDI might not be particularly useful where it comes to adapting to this change.

Loans and grants for climate change?

Can the region rely on loans for preparing for and adapting to climate change?

The regional long-term borrowing trends indicated a shift in 1995 from the previous upward movement. (Figure 3). However, that shift was unstable, as is demonstrated by the extreme lows and highs. Nevertheless, all countries remain in debt, and long-term borrowing fluctuates across the years. (Appendix 10).
Some important developments within the arena of international official assistance are a cause for SADC to worry. Emphasis now falls upon the idea that official assistance be conditional on the participation of the private sector and that there be burden-sharing between the public and private creditors (UNCTAD 2001). Such a condition might make assistance even more inaccessible.

Most of the countries are dependent on loans and grants. As shown in Table 5, only a small proportion of the debt, on average 4%, is paid per annum in the regions. Five of the countries, Angola, DRC, Malawi, Tanzania, and Zambia, are classified by the World Bank as severely indebted low-income countries.[4] Thus, while it might be inevitable to rely on loans to address climate change, it is clear that this would increase the country's and regions' dependency, making them even more vulnerable to global economic trends.

[4] These are countries whose present value of debt service to exports ratio is higher than 80%.

While on average most of the region's loans are obtained on a concessional basis (meaning they carry a grant element of 25% or more), some countries, such as Swaziland, rely quite heavily on non-concessional loans (those in which the grant element is less than 25%).

Payment of the interest on the loans constitutes as much as 28% of the total debt payment made per annum in some of the countries, despite the fact that governments are only able to pay a small fraction of their debt. The total debt during the 1990-98 period is lowest for Namibia and Seychelles, but highest for South Africa. Namibia's repayment record is, however, poor compared with the other two. Over the 1990-98 period, only five of the 14 countries were able to pay over 10% of their external debt (see Appendix 11). These records imply that the SADC countries are likely to remain in an undesirable marriage to their financiers for a long time. Borrowing for climate change, even if the money was to be made available, would thus place the region in an even more precarious financial position than it already is.

**Table 5. Total external debt and debt service payments*
(mUS$, current prices: long term loans and IMF credits)**

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Angola		8 594	9 004	10 070	10 586	11 172	11 382	10 425	9 838	11 223	10 915
	0	283	336	191	87	203	410	783	795	1 118	
Botswana	147	561	620	612	660	689	703	614	562	516	649
	14	106	89	98	90	93	92	151	102		
DRC	4 773	10 274	10 840	10 977	11 282	12 336	13 256	12 840	12 341	13 187	13 358
	497	327	158	64	15	6	18	42	0		
Lesotho	72	396	448	495	541	620	677	670	660	692	712
	5	23	26	34	33	29	40	37	45	71	
Malawi	830	1 558	1 665	1 709	1 826	2 025	2 243	2 315	2 228	2 444	2 594
	71	128	126	105	78	79	116	84	75	101	
Mauritius	467	984	1 043	1 051	1 008	1 382	1 757	1 818	2 472	2 482	2 392
	44	151	168	180	125	148	210	179	259	212	
Moz'bique		4 650	4 718	5 130	5 212	7 272	7 458	7 566	7 638	8 315	6322
	0	64	75	78	119	122	161	140	101	34	
Namibia										123	178
										1	
Seychelles	84	163	173	164	157	171	159	148	149	187	169
	0	18	15	17	17	16	23	15	14	17	
S Africa						21 671	25 358	26 050	25 221	24 711	24 901
						2 650	2 976	3 732	4 219		
Swaziland	210	254	245	222	208	220	235	222	368	251	437
	17	46	29	25	24	26	21	33	24	30	
Tanzania	5 322	6 451	6 558	6 678	6 791	7 235	7406	7 362	7 129	7 633	6385
	135	171	202	231	208	179	228	264	155	152	
Zambia	3 244	6 916	6 968	6 709	6 485	6 804	6 952	7 054	6 654	6 865	6 717
	411	200	596	352	363	371	2611	245	258	244	
Zimbabwe	786	3 247	3 437	4 060	4 285	4524	5 007	4 976	4 919	4707	4 566
	50	422	413	550	585	575	613	620	633	740	
Total debt	15 935	44 048	45 719	47 877	49 041	76 121	82 593	82 060	80 179	83 336	80 295
Total	1244	1939	2233	1925	1744	4497	7519	6325	6680	2720	

service											
* The debt is presented in the first row; while the second row shows the service payments.											

Can the region expect to fight the climate change battle with grants?

We examine the structure of long-term external financing for 1998 to highlight the role of grants compared with concessional and non-concessional loans (Appendix 11) On a regional level, grants and concessional flows are quite important sources of long-term financing. Mauritius receives a relatively low level of grants, with most loans being split almost equally between concessional and non-concessional loans. DRC, South Africa and Botswana were very dependent on grants for their long-term external financing in 1998. It would appear that even the poorer countries such as Lesotho relied heavily on nonconcessional loans –which might be because this was the only alternative.

Poverty-environment nexus

Can the poor contribute to preparedness for climate change or adaptation?

The vicious circle which links poverty with environmental degradation has been well documented (UNDP 1997; UNEP, 1999). Yet in addition to the threat of climate change, Africa is still the only continent that it is predicted will experience increases in poverty in the next century (UNDP 1998). Six of the 14 SADC countries are on the UN list of Low Human Development Indicators and their poverty levels have been falling further. The majority of the poor depend on subsistence farming for food, and forestry resources for basic needs such as fuel and shelter. Increased population and low productivity is forcing these people to encroach further into the forest resources while using their land in an unsustainable way. Recurrent droughts have aggravated the situation and resulted not only in lower crop yields, but also in degraded lands. Pests and diseases also result in low agricultural yields and hence push the poor to extract yet more resources from the forests.

On the global level, the use of forests as sinks to minimise climate change is being discussed, although the high dependence on the forests for the poor's livelihood cannot be ignored. These seemingly opposing objectives have been central to the LULUCF negotiations on climate change for a while. The reality in SADC is that forest resources decrease as the demand for land for settlement and agricultural use rises. Between 1990 and 1995, the area under forestry in the region decreased by about 0.6% per annum. If this trend is to be halted, the poor will have to effectively participate in the proposed strategies and adaptation measures.

Given that climate change is likely to cause a reduction in agricultural productivity, the subsistence farmer needs to be assisted to adapt in order to survive. Provision of information on appropriate strategies, such as less temperature-sensitive crops (like sorghum and millet) (Rao et al 1989), would be a useful adaptation measure. In a study conducted in India and Brazil, Mendelsohn and Dinar (1999) indicate that individual farmer adaptation, where they adjust their techniques using prevailing technologies, has the potential to reduce climate-related agronomic damages by one-fourth to one-half. This justifies the importance of focusing on individual subsistence farmers in SADC as implementers of adaptation measures.

According to WWF (2000), for centuries rural communities have learned to survive drought and harsh weather in Africa, but many of the water and soil management techniques, resistant crop varieties, and food production methods are known only locally, or to certain ethnic groups. These tried and true adaptive strategies need to be extended beyond their areas of origin in order to be more widely applied. However, a study by O'Brien et al, (2000) concludes that the prevailing information systems aimed at farmers in Southern Africa need to be improved, and at the same time small-scale farmers need to have the capacity to respond to climate variability and change.

Some of the SADC member states are undertaking Structural Adjustment Programmes (SAPs) or enhanced SAPs, and in some of these countries economic growth records have been good (UNCTAD, 1999). However, it is noted that even for 'core adjusters' and other African countries presently growing at a relatively high rate, it will take 70 years to double their per capita income levels, among the relevant populations, from US$1 to US$2 per day (Rasheed 1996). As such, adaptation measures outside SAPs are needed for survival of the poor.

Infrastructure: suitable for climate change?

Can the region's infrastructure support efforts to prepare for climate change and combat its impacts?

In addressing this question, we attempt to analyse the communication framework and information flows (Table 6). The information technology highway is hailed as the way to and of the future. Yet, the majority in SADC remain unconnected. In comparison, in 1998, USA had 112 internet hosts per 1000 people while the average for the SADC region was 0.57. Unfortunately this data is not available in a gender disaggregated manner, though it is safe to assumed that women have more limited access to information technology than men. As such its usefulness in addressing gender differentiated impacts of climate change is limited unless major leapfrogging occurs.

Table 6. Access to information flows,1996-98
Source: UN (2000)

	Main telephone lines per 1000 people	Public telephones per 1000 people	Cellular mobile subscribers per 1000 people	TV per 1000 people	Internet hosts per 1000 people, 1998
Angola	6		1	124	
Botswana	56	1,3	15	27	0,42
DRC				43	
Lesotho	10		5	24	0,01
Malawi					
Mauritius	214	2,1	53	228	0,5
Mozambique	4			4	0,01
Namibia	69	1,3	12	32	1,6
Seychelles	244	2,9	49	190	0,09
South Africa	115	3,5	56	125	3,26
Swaziland	30	0,9	5	107	0,29
Tanzania	4		1	21	
Zambia	9	0,1	1	137	0,03
Zimbabwe	17	0,2	4	29	0,08
Average					0,57

Institutional framework for addressing vulnerability to climate change

Within SADC

SADC has various organisations and mechanisms which can be used for tackling this issue. A description of them follows.

The **Southern African Centre for Co-operation in Agricultural Research** (SACCAR), aims at strengthening the national agricultural research system among member countries. The objective is to improve management, increase productivity, promote the development of and transfer of technology to local farmers and to improve training. In recent years it has handled projects relating to crop improvement, land and water management etc, in Malawi, Tanzania, Zimbabwe and Zambia.

The **regional early warning system**, based in Harare, maintains the supply and demand of food supplies in member countries. As a result of frequent drought in the region, when severe food shortages are experienced, member countries have agreed to inform the food security section of their food and non-food requirements on a regular basis. The objective is to anticipate and prevent food shortages.

The **sector co-ordination office for finance and investment** has also been established to mobilise industrial investment resources and to co-ordinate economic policies and the development of the financial sector.

To disseminate information on SADC, **the SADC Press Trust** (based in Harare) was established. Its objective is to articulate the priorities and consensus of member countries.

National contact points are located in the ministry responsible for SADC matters. Their responsibilities include regular consultation with, and briefings of, relevant government institutions, the enterprise community and media on matters relating to SADC.

The community also has the following **sector co-ordinating offices**, located in the country that has the expertise in the respective sectors.

- Agriculture and Natural Resources Research and Training (based in Botswana)
- Culture and Information (based in Mozambique)
- Employment and Labour (based in Zambia)
- Energy (based in Angola)
- Environment and Land Management (based in Lesotho)
- Finance and Investment (based in South Africa)
- Food, Agriculture and Natural Resources (based in Zimbabwe)
- Human Resources Development (based in Swaziland)
- Industry and Trade (based in Tanzania)
- Inland Fisheries, Wildlife and Forestry (based in Malawi)
- Livestock Production and Animal Disease Control (based in Botswana)
- Marine Fisheries and Resources (based in Namibia)
- Mining (based in Zambia)
- Southern African Centre for Co-operation in Agricultural Research (based in Botswana)
- Southern African Transport and Communication Commission (based in Mozambique)
- Tourism (based in Lesotho)

(www.sadc-online.com/sadc/index2.htm)

Other regional groupings

The SADC countries are members of other groupings such as the Common Market for Eastern and Southern Africa and the Southern African Customs Union (SACU), and some level of overlap also exists. Botswana, Lesotho, Namibia, South Africa and Swaziland are SACU members, while all the countries except Lesotho, Botswana Mozambique, South Africa and Tanzania are COMESA members.

Beyond SADC borders

Adaptation fund under the Kyoto Protocol

An adaptation fund has been proposed at the climate change negotiations within the framework of the Kyoto Protocol. This fund will be used to assist countries to adapt to climate change. The proposal is to fund it from 2% of the Certified Emission Reductions (CER) generated through the Clean Development Mechanism. (UNFCCC, 2001b).

Could the adaptation fund be adequate for SADC adaptation needs?

Predictions indicate that 2% of the CERs is likely to be a rather minimal amount and will be targeted towards all non-Annex I Parties, so that the share available to SADC can be expected to be small and insufficient for meeting the adaptation challenges.

Special Climate Change Fund under the Kyoto Protocol

This fund will finance activities, programmes, and measures related to climate change such as economic diversification. It is still unclear where the funding will originate from, though voluntary contributions from Annex I Parties seem to be the main proposal. This funding is accessible to both non-Annex and Annex 1 countries. The proposed US$1 billion additional climate change funding might seem attractive until one actually evaluates it relative to other funding (UNFCCC 2001b). In 1998 the total funding to Africa under ODA and FDI was about US$27 billion (UNCTAD 1999; World Bank 2001) but many countries still suffered major financial problems. The share of FDI to Africa is about 4% of the total inflows to developing countries. If this is used as an indicator of what might come to Africa from the US$1 billion in the climate change fund, the amount is a mere US$0.04 billion. As discussed earlier, the cost of damage to Mozambique as a result of flooding in 2000 was about US$0.49 billion, more than 12 times the amount likely to come to Africa from the fund.

Everything but arms

At the third UN conference on the LDC held in May 2001, the EU extended the duty-free, quota-free treatment to all LDC products except arms. Given the fact that seven out of the 14 SADC countries fall into this category raises the issue of whether this path could be useful in improving their vulnerability to climate change. The level to which this will be useful will depend on the ability of countries to raise their export levels and the extent to which the benefits will be equitably distributed so as to benefit the poor men and women who are likely to suffer most from climate change.

Conclusions

Africa as a continent is the most vulnerable region to the impacts of climate change. The SADC region is one of the most vulnerable in the continent. The region's poor economic performance does not put it in a good position to respond to the impacts of climate change. Continued civil strife in some parts of the region, political instability in others, and natural calamities, including droughts and floods, increases the region's vulnerability on the one hand, and also incapacitates the region in responding to the impacts of climate change .

The region's geophysical, social, economic and political diversity calls for innovative approaches and strategies to address climate change issues in a way that takes into account regional commonalities, as well as national differences and development priorities. This approach should also take into account the non-homogenous nature of the regional and national population groups. Particular attention needs to be given to high risk population groups such as the rural populations and the urban poor. Among these are women, children, the aged, and the disabled, for whom targeted specific interventions are needed.

The raising of awareness and capacity building for climate change have been the common strategies for attempting to address climate change issues in many regions, but to effectively cope with the problem, these will have to be coupled with economic

empowerment and diversification for the vulnerable groups. Targeted and implementable adaptation measures at the community level and elsewhere are needed.

SADC cannot rely on external assistance to address the impacts of climate change , as this is likely to be inadequate. ODA, for example, has been shrinking. Hence the region will have to innovatively re-appropriate its resources and integrate relevant measures to tackle climate change in the course of its development. This is a challenging task which would be more efficient if a regional approach instead of a national focus, is adopted. Some level institutional framework does exist and this could be used as a basis to implement appropriate measures. To integrate climate change into planning at regional level, strong leadership with long-term vision will be required. Aggressive awareness-raising among policy-makers on the interlinkages between climate change and the region's survival is overdue. This paper has attempted to highlight some of the main issues and could thus serve as a basis for such a campaign.

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Appendix 1: General SADC characteristics

	UN HDI ranking (2000)	Population (millions, 2000)				Area (sq. km)	Area suitable for agric	Labour force (1998, '000)	%female labour force (1998)	Labour force in agric as % of econ. active (1995)		No. of women working in agric per 100 men (1998)
		Tot	M	F	Rate 98-15					M	F	
Angola	Low	13,1	6,5	6,6	2,8	1247000	arable: 2% forest and woodland: 43%	5521	46,3	65	86	
Botswana	Med.	1,5	6,5	6,5	0,9	600370	arable: 2% forest and woodland 2%	687	45,5	39	55	
DR Congo	Low	50,9	25,2	25,7	2,9	2345410	arable: 3% forest and woodland: 78%	20 251	43,5	58	81	
Lesotho	Low	2	1	1	1,6	30350	arable: 10%	844	36,8	29	59	
Malawi	Low	11,3	5,6	5,7	2,2	118480	arable: 25% forest & woodland: 50%	5056	48,8	78	95	133
Mauritius	Med.	1,2	0,58	0,58	0,9	1860	arable: 54%	499	32,2	18	14	
Mozam-bique	Low	18,3	9	9,3	2	801590	arable: 4% forest & woodland: 20%	8812	48,4	70	96	153
Namibia	Med.	1,8	0,87	0,89		825418	arable: 1% forest & woodland: 22%	682	40,8	46	54	135
Sey-chelles	Med.	0,1				455	arable: 4% forest & woodland: 18%					
South Africa	Med.	43,3	21,3	21,9	1	1221037	arable: 10% forest & woodland: 3%	16147	37,6	16	10	
Swazi-land	Med.	0,9	0,46	0,47		17360	arable: 11% forest & woodland: 7%	356	37,6			
Tanzania	Low	35,1	17,4	17,6	2	945090	arable: 5% forest & woodland: 47%	16386	49,2	78	91	
Zambia	Low	10,4	5,2	5,2		752610	arable: 7% forest & woodland: 27%	4060	45	68	83	110
Zim-babwe	Med.	12,6	6,3	6,3		390757		5377	44,4	58	81	125
Total		202,5	105,91	107,74		9 297 787						

Appendix 2: Annual food production of cereals, roots, tubers and pulses (kg)
Source: World Bank (2001)

	1974-79	1980-89	1990-98
Angola	322,7	240,8	274,2
Botswana	120,1	56,9	45,8
DRC	553,9	556,2	497,6
Lesotho	196,1	127,6	122,6
Malawi	386,1	304,8	249,2
Mauritius	14,9	21,5	18,1
Mozambique	381,5	340,1	329,2
Namibia	267,3	244	210,9
Seychelles	3,3	2,2	2
South Africa	510,7	425,1	346,4
Swaziland	228	196,5	133,4
Tanzania	501,7	528,6	409,6
Zambia	340,4	244,6	209,1
Zimbabwe	354	308,8	216,2
Regional average	298,6	256,9	218,9

Appendix 3: GDP, real (millions US$, constant 1995 prices)

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Angola	5074	6371	6412	6083	4638	4703	5187	5706	6060	6253	6422
Botswana	1521	3986	4285	4413	4501	4662	4899	5239	5449	5639	5893
DRC	8458	9234	8457	7569	6549	6294	6338	6281	5923	6101	6589
Lesotho	490	764	793	832	863	892	933	1026	1108	1053	1079
Malawi	992	1234	1341	1243	1363	1224	1429	1533	1591	1623	1688
Mauritius	1741	3123	3256	3459	3647	3795	3973	4199	4430	4679	4838
Moz'bique	2006	2036	2136	1963	2134	2294	2392	2562	2846	3185	3417
Namibia	2280	2566	2776	2974	2923	3109	3224	3293	3380	3461	3568
Seychelles	314	441	453	485	515	511	508	532	555	566	574
S Africa	127410	144762	143288	140226	141956	146547	151113	157386	161359	162371	164369
Swaziland	591	1113	1141	1155	1193	1234	1267	1317	1366	1393	1421
Tanzania		4808	4908	4936	4996	5074	5255	5494	5687	5917	6197
Zambia	3351	3716	3715	3650	3898	3559	3471	3699	3821	3750	3841
Zimbabwe	4347	6689	7178	6576	6736	7102	7120	7843	8065	8362	8366
Average	12198,1	13631,6	13581,4	13254,6	13279,4	13642,9	14079,2	14722,1	15117,1	15310,9	15590,1

Appendix 4: GDP composition by sector (%)
Source: The World Fact Book (2000)

	Agriculture	Industry	Service
Angola (1998)	13	53	34
Botswana (1998)	4	46	50
DRC (1997)	58	17	25
Lesotho (1997)	14	42	44
Malawi (1998)	37	29	34
Mauritius (1996)	10	29	61
Mozambique (1998)	34	18	48
Namibia (1998)	12	30	58
Seychelles (1996)	4	21	75
South Africa (1999)	5	35	60
Swaziland (1997)	10	48	42
Tanzania (1996)	49	17	34
Zambia (1998)	20.6	30.6	48.8
Zimbabwe (1997)	28	32	40

Appendix 5: Net ODA from all donors (nominal, mUS$, current prices)
Source: World Bank (2001)

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Net ODA per cap (1999)[5]
Angola	53	269	279	346	291	450	418	473	355	335	388	31
Botswana	106	147	132	112	130	86	90	75	122	106	61	38
DRC	428	897	476	269	178	245	196	166	157	126	132	3
Lesotho	94	142	125	143	142	116	114	104	92	66	31	15
Malawi	143	503	523	572	495	467	432	492	345	434	446	41
Mauritius	33	89	67	46	26	14	23	19	42	40	42	35
Moz'bique	169	1002	1069	1463	1179	1200	1064	888	947	1039	118	7
Namibia		121	182	142	154	137	192	188	165	180	178	104
Seychelles	22	36	23	19	20	13	13	19	17	24	13	162
S Africa					275	295	386	358	495	512	539	13
Swaziland	50	54	53	53	52	56	55	30	27	30	29	28
Tanzania	679	1173	1080	1338	950	965	877	877	944	1000	990	30
Zambia	318	480	883	1035	872	718	2034	610	610	349	623	63
Zimbabwe	164	340	393	792	498	560	491	371	335	280	244	21
Total	2259	5253	5285	6330	5262	5322	6385	4670	4653	4521	3834	

[5] This consists of net disbursements of loans and grants from all official sources on concessional terms divided by midyear population.

Appendix 6: Net FDI flows in SADC (million US$)

Source: World Bank (2001)

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Angola		-336	665	288	302	327	303	588	492	1115	2520	6264
Botswana	109	89	-17	-12	-296	-24	30	89	100	100	100	268
DRC	0	13	0	0	0	0	0	0	0	20	100	133
Lesotho	4	17	7	3	185	249	295	278	290	193	180	1701
Malawi	10	0	0	0	0	0	0	30	24	34	39	137
Mauritius	1	35	14	-16	-18	10	26	18	26	-2	25	119
Moz'bique	0	9	23	25	32	35	45	73	64	213	382	901
Namibia		28	114	120	47	104	157	150	90	99	95	1004
Seychelles	6	9	8	-3	6	17	27	17	45	28	20	180
S Africa	-765	-5	40	-1933	-288	-856	-1256	-226	1466	-1171	262	-4732
Swaziland	18	23	58	50	44	-1	10	23	34	10	30	299
Tanzania		0	10	15	62	63	104	134	150	172	183	893
Zambia	62	0	0	0	3	40	97	117	207	198	163	887
Zimbabwe	-26	-12	3	15	32	30	98	35	107	436	50	768
Total	-581	-130	925	-1448	111	-6	-64	1326	3095	1445	4149	

Appendix 7: Gross public investment and net ODA as share of recipient GDP (percentage of GDP)*

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Av. 1990-99
Angola												
		2,6	2,3	6,1	5,6	11,1	8,3	7,1	5,8			
Botswana	12,5								14,2	14,3	14,4	4,29
	9,6	4,1	3,3	2,7	2,9	1,9	1,9	1,5	2,4			
DRC	5,1	4	2,6	2,8	0,9	0,6	4,4	2,5	2,5	2,8	4	2,71
		9,6	5,2	3,3	2	3,4	3,1	2,9	2,6			
Lesotho	31,6	45,3	53,7	55,4	58	58,6	52,8	55,7	63,3	71,5	15,6	52,99
	25,6	22,9	21,6	21,9	20,4	15,4	13,5	12,5	9,5			
Malawi	17,5	8	8,3	10,2	8,4	15,1	9,4	6,1	7,1	8,7	10,6	9,19
	11,6	28	23,8	31,9	24	40	29,6	22,1	14,2			
Mauritius	8,4	11,4	8,2	9,6	7,9	9,1	8	9,3	6,5	6,1	5,9	8,2
	2,9	3,4	2,4	1,4	0,8	0,4	0,6	0,5	0,8			
Moz'bique	7,6	12	11,4	12,8	12,3	14	12	10,3	10,5	9,1	10,4	11,48
	4,8	40,1	42,9	75,1	56,3	54,3	46	32,5	27,5			
Namibia	15,7	8,2	7,6	10,1	8,5	7,9	8,2	8,7	9,3	4,5	13,9	8,69
	0	5	7,2	4,9	5,7	4,5	5,7	5,9	5,1			
Seychelles		8,2	12,9	9,4	11,2	7,5	6,8	10,2	10	15	15	10,62
	14,7	9,8	6,1	4,4	4,1	2,7	2,6	3,7	2,3			
S Africa	13	7	6,1	5,2	4,4	4,1	4,3	4,4	4,5	5,4	4,6	5
	0	0	0	0	0,2	0,2	0,3	0,3	0,4			
Swaziland	11,8	7,2	12,1	12,2	10,3	9,3	6,3	5,6	4,9	5,5	5,7	7,91
	8,6	6,4	6,1	5,5	5,4	5,3	4,4	2,5	2,1			
Tanzania		10,5	8,8	9,2	7,5	6	3,4	3,2	2,9	3,1	2,8	5,74
		27,8	22,8	27,4	20,9	23	17,8	15,3	12,8			
Zambia	4	6,2	7,8	6,7	4,5	4	5,1	6	5,4	9,6	10,5	6,58
	8,2	14,6	26,2	32,5	26,6	21,5	58,6	18,7	15,4			
Zimbabwe	1,8	3,4	3,5	3,8	3,6	3,1	2,9	2,3	2,8	1,7	4	3,11
	2,5	3,9	4,6	11,7	7,6	8,2	6,9	4,4	3,9			
Average	11,7	11	12	11	11	12	10	10	11	12	9	
	8,0	12,7	12,5	17,1	13,0	13,7	14,2	9,3	7,5			

* First row is the gross public investment and second row is the net ODA.

Appendix 8: Gross private investment (percentage of GDP)

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Av. 1990-99
Angola		1,7	10,5	0,1	19,8	21,3	21,3	21,7	20,7	22,7	28,2	16,8
Botswana	19,1								7,1	4,6	3,5	1,52
DRC	3,7	8,9	3,5	4,3	1,4	7	5,3	4,6	4,6	5,3	6,6	5,15
Lesotho	4,1	8	12	10,2	-2,4	-1,5	8,4	2,4	-8,6	-22,1	39,5	4,59
Malawi	4,7	8,6	8,7	6,9	4,6	11,6	5,1	3	2,7	2,4	2,3	5,59
Mauritius	14,9	19,2	20,4	18,3	20,6	21,7	16,3	16,7	20,8	18,3	21	19,33
Moz'bique	-1,7	3,6	4,7	2,8	0,4	5,8	10,8	10,7	7,8	14,4	20,9	8,19
Namibia	11,4	13,1	8,6	10,9	13,9	13,1	14,3	15,7	9,7	8,8	16,1	12,42
Seychelles		14,8	8,4	11,5	15,6	17,9	23,6	40,6	25,8	22,5	22,5	20,32
S Africa	12,9	12,2	11	10,4	10,3	11	11,6	11,7	11,8	11,1	10,3	11,14
Swaziland	13,3	11,7	7,5	13	15,5	21,9	27	23,6	28,2	6,2	6,6	16,12
Tanzania		15,3	17,2	17,8	17,4	18,5	16,2	12,8	11,8	13,3	14	15,43
Zambia	17,2	7,2	3,5	3,8	7,9	7	7,3	5,2	7,7	5,2	5,4	6,02
Zimbabwe	12,3	14,8	17,1	18,6	19,9	18,3	21,9	15,7	15,1	17,9	6,2	16,55
Average	9,3	10,7	10,2	9,9	11,1	13,4	14,5	14,2	11,8	9,3	14,5	

Appendix 9: Privatisation of public enterprises
Source: World Bank (2001)

	Total no. of transactions	Transactions completed						Gov retains majority ownership
		Before 1995	1995	1996	1997	1998	1999	
Angola	331			56				
Botswana	40							
DRC	61	2	44	15				5
Lesotho	21	2	7		1	4	6	4
Malawi	68	35		8	5	5	12	
Mauritius								
Mozambique	579	217	398	112	38	31		43
Namibia								
Seychelles								
South Africa	13	3		1	2	3	3	6
Swaziland								
Tanzania	283	86	22	46	40	64	23	29
Zambia	268	30	60	91	55	16	10	30
Zimbabwe	6	2			3		1	
Total	**1 670**							

Appendix 10: Net long-term borrowing (mUS$, current prices)

	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Angola		679	96	501	622	263	215	124	385	-122	-672	2091
Botswana	21	-37	49	23	45	-10	1	-45	-52	-33	75	37
DRC	271	267	263	55	54	1	0	3	0	0	198	1112
Lesotho	10	43	47	59	50	44	44	33	34	26	215	605
Malawi	120	69	120	106	151	74	149	121	129	121	109	1269
Mauritius	79	101	77	-1	22	83	255	32	691	-102	349	1586
Moz'bique		189	73	168	153	176	196	222	221	181	217	1796
Namibia										5		5
Seychelles	12	-4	9	13	6	8	-7	2	2	9	23	73
S Africa						1524	1478	-478	-105	-386	-698	1335
Swaziland	21	-21	-6	-10	-9	-4	3	8	8	3	3	-4
Tanzania	318	209	162	222	139	158	131	63	166	120	459	2147
Zambia	388	63	102	136	99	109	110	80	108	-49	46	1192
Zimbabwe	93	177	239	426	322	57	171	33	63	-165	86	1502
Total	1333	1735	1231	1698	1654	2483	2746	198	1650	-392	410	

Appendix 11: Structure of long-term external financing

	Total external debt (1990-1998, mUS$)	Total external debt payment (1990-98, mUS$))	% paid	Balance unpaid (1990-98, mUS$))	Grants (1998, % of total)	Concessional loans (1998, % of total)	Non-concessional loans (1998, % of total)
Angola	92 294	4 206	5	88 088	61.4	34.4	4.2
Botswana	5 537	821	15	4 716	82.7	15.7	1.6
DRC	107 333	630	1	106 703	87.5	12.5	
Lesotho	5 199	338	7	4 861	19.3	47.5	33.3
Malawi	18 013	892	5	17 121	26.3	73.4	0.3
Mauritius	13 997	1 632	12	12 365	4	51.7	44.3
Moz'bique	57 959	894	2	57 065	56.6	40.9	2.4
Namibia	123	1	1	122			
Seychelles	1471	152	10	1 319	13.1	58.8	28.1
S Africa	123 011	13 577	11	109 434	84.3	0	15.7
Swaziland	2 225	258	12	1 967	19.3	0	80.7
Tanzania	63 243	1 790	3	61 453	47.2	50.9	1.9
Zambia	61 407	5 240	9	56 167	24.4	73.7	1.8
Zimbabwe	39 162	5 151	13	34 011	14.5	60.4	25.1
Average					46	40	20