Horizon scanning in South Africa:

The potential impacts of climate change on poor households.

John Seager

Research Director

Nthabiseng Mohlakoana

Chief Researcher

Urban, Rural and Economic Development,

Human Sciences Research Council

20 September 2007

Commissioned by the Presidency.

Executive summary

International panels have recently concluded that human-induced climate change is an irrefutable fact. The Stern Review, in particular, presented convincing economic arguments for why moderately costly interventions are urgently required to prevent much more costly impacts later. However, despite these well-intentioned pleas for action to *mitigate* global warming, there is compelling evidence that our climate will get hotter and more variable long before we are able to reverse the current trend: thus we need to *adapt*.

The predictions also clearly indicate that Africa will experience the most severe climate change, while being the least able to cope with its consequences. It is for this reason that while we need to make a contribution to reducing our 'ecological footprint' (which is one of the largest on the continent), we must give urgent attention to how we can learn to achieve sustainable development in a warmer, drier, and potentially more unstable, climate.

In terms of mitigation, there are various energy-related strategies that South Africa is beginning to implement. Some of these relate to direct reduction in consumption while others concern the promotion of sustainable technologies, such as solar water heating and thermally efficient buildings. There is considerable potential for government involvement in the promotion of alternative technologies.

The scenarios for which we have to prepare adaptation strategies are complex and challenging. Agriculture is likely to be profoundly affected in the longer term with much of South Africa predicted to have conditions which are not represented by any current biomes. Growing seasons are already changing and alternative crops will have to be planted in some areas. However, there is concern that pressure will be exerted by the 'north', through the carbon credit system, that may make the cultivation of bio-fuels or forests, more commercially attractive than food crops. This situation could have short term impacts on food security and longer term consequences for global warming, if it allows the 'north' to prolong high carbon emissions.

Other issues identified include declining biodiversity, which is the mainstay of the African tourism industry. There is also potential for large numbers of environmental refugees, as a result of failing agriculture and severe weather events, such as high winds and flooding. These events also have health consequences with damage to infrastructure, especially water and sanitation, and increased transmission of tropical diseases such as malaria.

These scenarios call for increased efforts to make the public aware of climate change issues and to provide information that will allow ordinary people to engage with the challenge in practical ways.

Both government and non-governmental organisations have a role to play in gearing up health, housing and disaster management programmes for these future challenging scenarios.

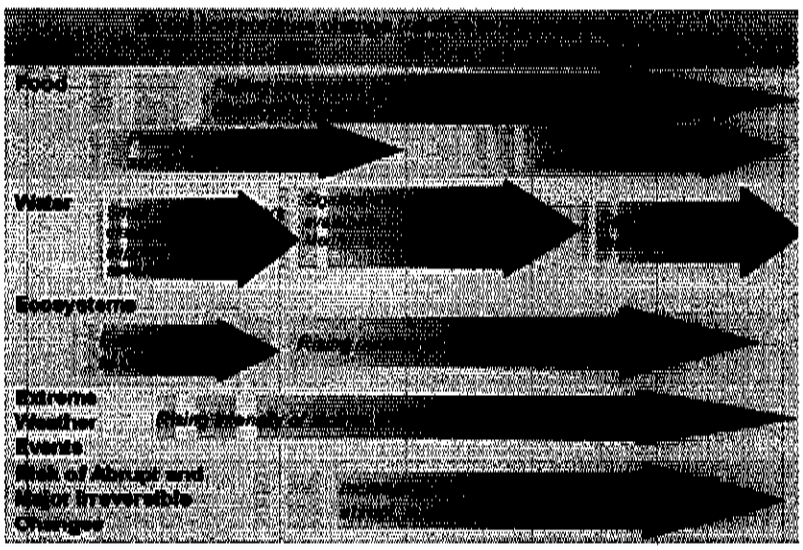
1. A review of alternative forecasts for how context might play out by 2030

> *The reality in the South is quite different: climate change has primarily come to be seen as a human welfare problem…The harm is against humans, it is largely other-inflicted, and it is not life-style, but life-threatening. In short, the chief victim of climate change is not 'Nature', but people, and the paramount inequity is one between human victims and human culprits.* Benito Müller[1]

There is overwhelming evidence that climate change is no longer merely a distant threat but an urgent challenge to human development. The recently released Stern Review[2] clearly demonstrates the economic argument for urgent action to mitigate the impacts of current greenhouse gas (GHG) emissions.

Experts differ in their estimates of how great climate shifts will be, or precisely when they will occur, but there is no doubt that anthropogenic changes to climate are taking place and will continue to do so for many decades before there appears to be any hope of reversal.[3] The Stern Review places considerable emphasis on the need to stabilise global CO_2 at a level considerably higher than the present one and these targets fit a scenario in which we will see global warming of between 2 and 3°C. Whilst 2 to 3°C may not sound like very much, it is a sobering thought to consider that the current climate is only 5° warmer than the last ice age. Some of the anticipated effects of global warming are summarised in Fig. 1.

Figure 1 Projected impacts of climate change



Source: Stern Review, 2006

The most striking conclusion from this simple graphic is that the conditions which are highlighted for a 2-3° increase in temperature are those which are likely to have

profound impacts in Africa. Much of Africa is already food insecure and declining crop yields are predicted for most regions. Regional climate changes and responses of different biomes are not uniform, and there will be some areas which may experience more favourable conditions, but the consensus is that *overall* there will be a drastic decline in agricultural production in Africa.

Water shortages are already of concern for much of Africa and in South Africa, water shortages have been identified as a potentially binding constraint for development.[4] The predicted scenarios indicate that most regions in Africa will experience less rainfall, with a few areas, such as east Kenya and north-east South Africa, experiencing a greater frequency of heavy rains. Although this will represent a local increase in absolute rainfall, it may be storm related and cause damage and increased soil erosion.

Rising temperatures are predicted for most of the region with temperatures in southern Africa predicted to rise by 5°C or more by 2080, for some emission scenarios,[5] according to the Intergovernmental Panel on Climate Change (IPCC). Various South African data sources indicate steady increases in temperature over the past 10-20 years.

2. Implications for the sub-region

Whilst mitigation strategies that reduce the anthropogenic contribution to climate change are essential, long before we are able to turn the tide by better management of greenhouse gases or alternative energy strategies, we are going to have to adapt to the consequences of climate change. Understanding social adaptation is just as important as strategies to mitigate impacts and appears to be a neglected area of research. Nowhere else is this more important than in Africa, which, according to numerous sources (reviewed by Nkomo, Nyong & Kulinda, 2006),[6] is not only likely to experience some of the most dramatic climate shifts but is both more sensitive to changes of climate, being more dependent on its ecosystems than most other regions, and has relatively low capacity for adaptation due to general underdevelopment in the region.

Mitigation strategies are required to reduce of the causes of climate change, and adaptation involves changing the ways that we do things, so that sustainable development remains possible despite warmer, drier conditions.

2.1. Mitigation issues

Despite a relatively small ecological footprint in the global climate change scenario, South Africa has been identified as one of the largest per capita contributors to greenhouse gas emissions on the continent. This is largely due to plentiful supplies of cheap, but low quality, coal that are currently used to produce the cheapest electricity in the world. Thus, one of the reasons that South Africa is a literal and economic

'power house' may cause the country to be singled out to make larger contributions to GHG mitigation strategies than neighbours to the north.

Long term planning, primarily driven by the Departments for Minerals and Energy (DME) and Environmental Affairs and Tourism (DEAT), with close cooperation from the private sector, such as the electricity utility Eskom, seeks to address these issues. However, there will always be great tensions between finding cost-effective cleaner technologies while striving to cater for rapid industrial growth. A concern expressed at recent international meetings (IPCC and others) is that developing countries may be forced to adopt expensive "foreign technologies" to reduce their GHG emissions, the costs of which may exceed their benefit in terms of the global emission scenario.

According to the DME Energy Efficiency Strategy document (2005), industry and mining sectors account for 47% of total end-user energy demand in SA; the commercial and public building sector accounts for 3.5%; the residential sector accounts for 16.4%, although much of this energy is consumed in the form of biomass in the rural areas; and the transport sector is responsible for 27% of final energy demand, where 97% of this is petroleum products and 3% is electricity.

It is interesting that the relatively small domestic consumers received so much attention during the energy crisis experienced in the western Cape during 2006. Some quite radical measures were introduced whereby energy efficient light bulbs and gas stoves were supplied free of charge to consumers in order to reduce demand. Targeting households did not address the highest energy consumers but was probably an attractive option in that it provided a simple intervention, with a large target population, that could achieve immediate benefits.

In terms of demand side management for major consumers of energy, energy audits are carried out in industries, commercial, public buildings and in the transport sector to facilitate lower energy consumption. Eskom and government pay half the cost of an energy audit and retrofitting buildings with energy efficient appliances and machinery. These interventions will certainly contribute to the overall reduction of South Africa's energy consumption and thereby potentially reduce GHG emissions. However, energy efficiency needs to be motivated by more important issues than mere cost savings; sustainable development depends on a radically different approach to energy consumption.

2.2. Adaptation

A critical issue that straddles the mitigation and adaptation strategies is the anticipated demand for the more ecologically 'friendly' biodiesel. Some biofuels are already cost effective[7] but if the price of oil increases even marginally, growing fuel crops will be more attractive than food crops and this may impact on food security. Within South Africa there is very little arable land that is not already cultivated and expansion of agriculture through irrigation of new land is constrained by water availability, which is predicted to decline further with global warming. It is also worth noting that water is not only critical for agriculture but is a requirement for most types of industrial development as well.

Another area of concern is the pressure likely to be exerted on agriculture by the carbon credit system which encourages countries in the 'south' to maintain forests and other vegetation in order to offset carbon production in the 'north'. This strategy is highly controversial and the debate rages. Countries in the 'north' argue that it is potentially a major source of income for developing economies while critics argue that it not only allows the north to continue with unsustainable levels of carbon emissions but may compromise food production in the south. Other concerns relate to the proliferation of relatively sterile monotype forests which may have serious consequences for long term biodiversity.

In another context, biodiversity, is critical to the South African tourism industry, and will decline with generalised drying of the climate. A recent study by Turpie et al.[8] concluded that negative impacts on biodiversity could have a significant impact on GDP as a result of declining tourism revenue. The question becomes more complex when one considers that the decline will be relative, depending on the extent to which biodiversity declines elsewhere. However, in the absence of alternative, less biodiversity-sensitive, attractions, tourist numbers will inevitably decline. In parallel with the biodiversity issue, increasing malaria prevalence may lead to tourists seeking less hazardous destinations.

Another important response to climate change in regions primarily dependent on agriculture is likely to be large scale migration (see section on migration by Cross). Marginal agricultural land is likely to become unable to support the current population and people will migrate, initially to secondary towns, but later probably to the larger cities, both within and beyond the country of origin.

The next issue to be considered is the increasing probability of extreme weather events, notably high winds, exceptional rainfall and consequential flooding. These factors disproportionately affect the poor. The better-off usually enjoy greater livelihood choices and have assets with which to mitigate economic shocks. The net result being that the wealthy can avoid the immediate consequences of climate change, whereas the poor are obliged to adapt to it. Extreme weather events also lead to damage to infrastructure (housing, roads, water, sanitation) which is likely to compromise recent development and health gains resulting from the provision of services to the poor.

With regard to health, extreme weather events such as flooding are likely to impact on diarrhoeal diseases, in the short term, and malaria in the medium term. Predictions indicate that as global warming proceeds, the times of year during which malaria transmission occurs will increase and the breeding range of the malaria mosquito will increase in absolute area. By the end of this century large parts of Limpopo, Mpumulanga and the Eastern Cape, which are currently malaria free, may become transmission areas. Tanser et al.[9] calculate that malaria is likely to become endemic at higher altitude and increase the population at risk in South Africa to 7.8 million, vastly more than the current situation.

Other health risks relate to rats and other vermin being displaced by floods and fire, both of which will become more frequent. When vermin move into inhabited areas in

large numbers this poses both a nuisance (damage to food and possessions) plus potentially serious health risks (e.g. plague).

Many of the changes resulting from global warming call for more innovative housing designs, especially for the poor. For those who cannot afford clean energy, thermally efficient housing (warm in winter and cool in summer) can reduce energy consumption and improve health. Rising temperatures will be more extreme in urban areas due to the heat island effect. Thermally inefficient housing is prone to extreme temperature variations which can prove life-threatening, especially for vulnerable persons such as the elderly and the very young. Whilst one does not generally think of heat killing people in Africa, IPCC data demonstrates a strong correlation (0.67) between temperature and death rates in July for Europe. If heatwaves already kill people in European cities, most of which have modern infrastructure, the situation will certainly be worse in the growing, overcrowded, informal settlements of African cities as they get hotter.

3. Uncertainties/Challenges/Opportunities

- The uncertainties of climate change predictions have been used, especially in the 'north' to delay action. We urgently need to move ahead now on the basis of very strong evidence that change is happening and will get worse if we do not act decisively now.

- Climate change is currently a relatively low priority for people in the Africa region, especially the poor. It is hard to plan 30 years ahead when you are unsure where your next meal is coming from. However, public opinion is changing and needs to be monitored – increased awareness will lead to demands for positive steps to be taken. Ongoing measurement of social attitudes regarding climate change (as is currently being done by the HSRC) is required.

- It is critical that responses to climate change by people of the 'south' are appropriate for the development goals of the region. Some current initiatives (e.g. biofuels, carbon trading) have questionable, and probably short-term benefits for the 'south' but may have negative longer term consequences for the 'north' and, ultimately, all.

- Substantial resources have been invested in climate modelling but much more research is needed to understand social implications of climate change and how people can adapt.

4. Policy Implications

- There is a need for increased public awareness about these issues and they need to be addressed through education at all levels.

- Measures are needed to empower ordinary people and show them that they can make a difference. Currently there may be a sense that the 'problem' is caused by developed countries and therefore beyond our control. The voice of the 'south' is gaining strength and if used correctly can lead to innovations that will improve the chances of sustainable development without being dependent on aid or technology developed in the 'north'.

- With government in South Africa having such a large stake in the provision of low cost housing, there is a great opportunity for legislation to promote energy efficient structural designs and the use of renewable energy devices such as solar water heaters.

- Too much emphasis may be given to poor households – commercial properties and industry clearly use far more energy and must be given incentives to reform.

- Whilst better predictive models will help, more sophisticated disaster risk management and preparedness is needed. Until very recently, tsunami warning systems were considered too costly; now they have been implemented in many countries. Whilst South Africa does not face serious risk from tsunamis, storm surges, heavy rains and flooding will become more common and need to be managed effectively.

- Gearing up of preventive health programmes will be necessary. Malaria control is already well developed but will need to be expanded. Current programmes for providing water and sanitation already have substantial health benefits (although diarrhoeal disease remains the second highest killer of infants) but with increasing temperatures the need becomes more urgent.

- Tourism currently contributes 5-10% of GDP. Conservation efforts become a critical economic issue when tourism depends on biodiversity which is increasingly threatened.

- Many of the issues cited above have profound long term implications for fiscal policy. Subsidies are required on eco-friendly technology, including basic housing, food production and water conservation.

- There are also widespread implications for social grants policies as South Africa is likely to face an increasing number of environmental refugees from within and beyond our borders.

5. References/ Endnotes

[1] Müller, B. 2002. *Equity in Climate Change: The Great Divide.* Oxford: OIES.

[2] Stern, N. *Stern Review on the economics of climate change.* http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm 20 September 2007

[3] Met Office, 2003. *Climate change: observations and predictions.* Exeter: Met Office 12pp.

[4] Department of Environmental Affairs and Tourism. 2006. *Addressing the mainstreaming of the environment into development: Issues & opportunities relating to AsgiSA.* Workshop report with recommendations from the National Environmental Advisory Forum (NEAF) workshop. Unpublished report. 14pp.

[5] Intergovernmental Panel on Climate Change, 2007. *The Working Group II contribution to the IPCC Fourth Assessment Report.* http://www.gtp89.dial.pipex.com/chpt.htm 20 September 2007

[6] Nkomo JC, Nyong AO, Kulinda K, 2006. *The impacts of climate change in Africa.* Report submitted to the Stern Review on Climate Change.

[7] Cline W.R. 2007. *Global warming and agriculture: Impact estimates by country.* Washington: Center for Global Development.

[8] *PASE Study: The economic impacts of climate change in South Africa.* http://www.pase.uct.ac.za/studydetail.php?s_id=12 20 Sept 2007

[9] Tanser, FC, Sharp B, le Seur D, 2003. Potential effects of climate change on malaria transmission in Africa. *Lancet* 362: 1792-8.