



CLIMATE CHANGE

FACTS, THREATS AND SOLUTIONS

Introduction

This document was conceived and compiled by a diverse group of people in academia, conservation stewardship, LandCare and agriculture. Its aim is to inform the facts, as they are presently known, about climate change and global warming as well as to offer some solutions to counter the effects.

We believe that land-owners and conservationists will find it extremely difficult to continue “doing what they do” without understanding that the playing fields have changed and will continue to change as the effects of climate change become more entrenched. In order to survive and continue to prosper will require a quantum shift in behaviour and thinking. We hope this document will supply some steps in that direction.

We are targeting the following sectors:

- Landowners from different agricultural sectors
- Landowners working in conservation
- Conservation bodies working with landowners
- Policy makers

Our National and Provincial Governments are very aware of the threats from climate change and this year has had several seminars and workshops around the subject.

In her keynote address at last month's climate change seminar at Kirstenbosch, Minister Tasneem Essop highlighted the links between sustainable development, spatial development and provincial adaptation and mitigation response to climate change. Ms Shirley Moroka from the National Department of Environmental Affairs (DEAT) outlined the National Climate Change Response Strategy and indicated that a range of government departments were responsible for policy change and awareness raising about climate change, including Minerals and Energy, Water Affairs and Forestry, Agriculture, Transport, Education, Trade and Industry, Science and Technology, and Housing.

We note below several concerns raised by the ministers and delegates:

- The challenges that climate change poses for residential consumption behaviour, and the relationship between consumption and socio-economic inequality.
- Emphasised the need to understand the nuances of likely changes in the Western Cape's climate, the importance of learning from recent crises – such as the drought – and demonstrated consensus on the need for climate change education at all levels.
- De-contextualising climate change from development demands. Without an adaptation strategy, climate change could hold development and poverty alleviation back. Poverty and inequality could be exacerbated by efforts to reduce consumption of natural resources
- lack of awareness about climate change and its impacts, from leaders down
- maintaining international competitiveness of the agricultural industry
- Water and energy emerged as critical areas of concern.
- The impact of climate change on sectors that create employment and sustainable livelihoods, such as agriculture, fishing and tourism, and to the challenges posed to infrastructure, especially housing and transport.
- The impact on human health, marine systems and biodiversity.
- Physical vulnerabilities to climate change: health (e.g. water-borne diseases and malaria), water supply, agriculture, forestry and biodiversity.
- Economic vulnerabilities to climate change: developing economy, fossil fuel base to economy, coal exports may fall, possible trade restrictions associated with energy intensive goods, financial constraints to obtain better technology
- recognise that South Africa's emissions will continue to increase as development is realised.

It was agreed that political leaders and the people of the Western Cape need to make a paradigm shift to long-term planning and integration.

WHAT IS CLIMATE CHANGE?

Climate Change - Fact or Fantasy - by Dr Guy Midgley (extract from unpublished popular article)

For those of you who are confused and bewildered by the force of emotion and passion that some bring to the issue, here are a few facts

- “Climate change is nothing new; it's all happened before.” The answer to that is, yes it has, but neither in the same way nor to the same degree.
- Yes, rapid climate change has occurred in the past, **but the critical point is** that global mean temperature has oscillated for many hundreds of thousands of years between a frigid glacial level of below 10 °C and the balmy interglacial levels of 14-15 °C during interglacials.
- Human-induced climate change **will cause this level to be exceeded sometime in the next 50 years**. And further increases into new temperature territory will continue for several decades beyond if we do not curb greenhouse gas emissions. The cool Earth to which most of our natural species and existing farming practices has evolved will become warm enough to be outside the evolutionary experience of many species and unable to sustain current farming practices.
- Modern industrial agriculture is one of the biggest contributors to the rapid advance of human-induced climate change
- People that deny climate change is happening often say: "If you can't predict the weather next week how can anyone predict

climate in a few decades, right?" This baloney argument confuses weather with climate. (It's said that if you don't like the weather, then wait till tomorrow – but if you don't like the climate, get ready to relocate).

Two years ago – 2003/2004 - the Western Cape suffered a serious drought, leading to the declaration of a “State of Emergency” by the Premier of the Western Cape. The Premier, in collaboration with other provincial Ministers and heads of departments, decided that the Department of Environmental Affairs and Development Planning, must undertake a response study on climate change in the Western Cape - to understand climate change and its effects on the Western Cape as well as develop a response mechanism. Dr Guy Midgley, Chief Specialist Scientist for SANBI Climate Change Group, led this study, **which confirmed that the Western Cape is being impacted by climate change**

CONCLUSIONS BY LEADING RESEARCHERS:

By: Prof. Bruce Hewitson, UCT: Climate trends and projections:

The physics of climate change are indisputable, evident in atmospheric carbon dioxide, global temperature increases, Arctic changes and changes in rainfall trends. Model based studies attribute this to anthropogenic actions.

The change manifests as:

- increase in mean temperature
- increase in variance of temperature
- increase in mean and variance, resulting in less change for cold weather

2005 was the warmest year on record, the last eight years were the warmest in the last 100, and the last century was the warmest in the last 1200 years.

Western Cape trends are not simply about becoming drier or wetter; it's a complex situation. For example, areas that are predominantly dependent on cold fronts are getting drier. But with increased humidity, fynbos captures more water in the mountains. Trends indicate increases in rainfall intense events, reduced total rainfall in the west and increased orographic rainfall towards the east. Not just change in averages, but also change in extremes.

Changes occur in space and time and place stress on all facets of the infrastructure and capacity of society.

Considerable scientific agreement about the pattern of change but uncertainty about the magnitude.

Key recommendation: Adaptation, based on science. Adaptation has a very important role over the next 50 years; mitigation has a longer time span. Adaptation is complex, given the coupled natural, social system: what happens elsewhere affects us in the Western Cape (e.g. melting Arctic ice caps will affect shipping to South Africa, and therefore the economy). Climate change will not disappear with Kyoto.

By: Dr Guy Midgley, SANBI: Ecosystems and biodiversity impacts of Climate Change

Much of the modern biota evolved under cooler conditions than currently prevail.

Succulent Karoo is more sensitive to climate change than fynbos biome

Mountains buffer the impacts of climate change

Nature provides valuable warning signs – e.g. Kokerboom

Empirical warning signs, evidenced by succulents showing distress and mortality in warming chambers

As hotter and drier conditions become more prevalent, fires burn over more often, over more extensive areas, with the concomitant possibility of the fire cycles over larger areas becoming synchronised, which means more populations would be present only as seedlings. This could result in post-fire drought and mass extinction event.

SHORT TERM SCENARIOS

SOIL

Loss of land suitable for production as a result of desertification

- Soil loss due to wind and water erosion
- Decrease in soil quality as organic content, soil life and minerals are lost
- Extreme natural disasters (floods, landslides, earthquakes, etc.) will lead to erosion
- Increased frequency, intensity & unseasonal fires will damage soils & plants leading to alien plant invasion and wind erosion
- Soil moisture will decrease due to loss of cover and accompanying loss of organic content in the soil

HUMAN HEALTH

Environmental degradation leads to reduced quality of life and productivity

- air pollution,
- sanitation problems due to stress on storm water drains,
- heat stress for outside workers, etc.

ATMOSPHERE

Climate change induces practises that lead to increased carbon emissions and radiation

- Increased temperature and temperature extremes
- Loss of required cold units essential for fruit & vineyard production

NATURAL ENVIRONMENT

Loss of biodiversity leads to an unstable environment

- Degradation of natural zones leads to loss of environmental services such as soil formation, water retention and flood attenuation, pollinators and soil life
- Changed alien invasion patterns increase threat to biodiversity and productive potential

WATER

Increase in frequency and extremity of natural disasters

- Erratic rainfall patterns leading to extreme droughts and rainfall events e.g. storms and floods
- Reduction on quantity and quality of groundwater and the recharge rate

ENERGY SUPPLY RISKS

Climate change will have severe impacts on all energy sectors

Risks to electricity supply due to impact of climate change on water availability (for cooling)

- Risk of delayed action in the energy sector technologies – opportunities
- Continued use of fossil fuels resulting in polluted products for exports, e.g. irrigated crops

THE EXPECTED IMPACTS OF CLIMATE CHANGE

- Risks of continued dependency of diminishing oil – will be very expensive later
- Dependency on Eskom (Western Province generated 1% of national total), could something happen to Eskom because of climate change?
- Risk of discriminated South African products – proceeds of dirty technology
- Energy demand will change due to extreme weather events and increased urbanisation

WHAT YOU CAN DO TO MITIGATE IMPACTS OF CLIMATE CHANGE

General Principles of Natural Resource Management Best Practise:

- Acknowledge the threat of climate change both human-induced (industrial agriculture) and natural, adjusting management plans accordingly
- Look and Learn - Be open-minded, proactive and adaptable
- Participate in collaborative management across the landscape through existing structures such as farmer organisations, conservancies, LandCare forums, Water Forums and Fire Protection Agencies.
- Lobby with these organisations for education and assistance if this is not forthcoming.
- Demand the appropriate quality products and services
- Save energy and explore renewable energy sources
- Reduce, Reuse and Recycle
- Know your rights and obligations for e.g. right to healthy environment, duty of care for environment
- Encourage effective partnerships between stakeholders
- Inform and educate yourself and pass this on to others.
- Use appropriate wind break species e.g. indigenous trees and restios

THIS IS WHAT YOU CAN DO NOW!

LOOK AFTER YOUR SOIL

- Maintain as much soil cover as possible (Cover crops, Mulch)
- Manage veld and riparian areas
- Introduce and maintain diversity of plant life and habitats that will maintain diversity of all other life.
- Manage, reduce and rehabilitate erosion. (re-plant, use gabions and swales)
- Increase soil life and organic matter
- Reduce tillage to an absolute minimum
- Minimise the use of chemical fertilisers with the aim of nil usage.
- Replace chemical fertilisers with compost, cover and sacrificial crops, humus, worms, microbial life, natural mined minerals.

LOOK AFTER YOUR WATER

- Store surplus water (earth dams, rain tanks on all buildings)
- Re-direct water runoff (swales, canals, ponds)
- Avoid water run-off (cover-plants, mulching)
- Recycle (grey water from houses, factories, etc)
- Investigate desalination (Use internet to look at desalination experiences of Australia, Saudi Arabia, Israel and Namibia)
- Reduce/avoid evaporation (Cover water storage areas where possible).
- Bury all water pipes to reduce evaporation, leaks, and sun damage.

LOOK AFTER YOUR NATURAL ENVIRONMENT

- Remove invasive alien plants & other organisms and restore natural habitat
- Establish shelter belts, maintain & protect wildlife & natural areas
- Use good agricultural practices that include crop rotation and reduction of the use of harmful chemicals
- Greening using indigenous species to create beneficial microclimates
- Wise use of biodiversity e.g. sustainable harvesting
- More efficient use of energy and fuel switching to more sustainable fuels
- Replace old diesel engines, the cause of major pollution
- change to renewable energy (wind power, solar power, biomass, micro-hydro)

PRACTISE EFFICIENT IRRIGATION and WATER USAGE

- Anticipate reduced quantity of water available for irrigation
- Manage irrigation by scheduling according to plant demand.
- Use soil moisture probes and irrigate according to need.
- Maintain irrigation systems (remove from dead plants, fix leaks)
- Design an optimal system (use drip irrigation where possible)
- Deep mulch and irrigate less.
- Planning for change – site, crop and cultivar selection, row direction

- Changing the micro-climate - e.g. Shade-netting, evaporative cooling, reflective particle film

LOOK AFTER CATCHMENT AREAS & RIVERS

- Maintain biodiversity and soil cover
- Appropriate fire management
- Erosion control and restoration
- Wetland and riparian zone conservation & restoration
- Control invasive alien plant & organisms

ACTIVELY EXPLORE ALTERNATIVE PRODUCTION METHODS AND LANDUSE

- Climate change, organic and biological farming, awareness workshops and farmer mentoring
- Sustainable harvesting of wild rooibos, medicinal plants, fuelwood and restios as thatching material

ADVANTAGES OF MITIGATION TO YOU AS LANDOWNER

- Improved quality of life
- Avoid crop and bio-diversity loss
- Avoid reduction in value of property, and instead increase value
- Increased productivity
 - Reduction of input costs
 - More crop per drop
 - Higher quality product
 - More competitive
- Possibility of carbon funding to support sustainable development
- Forewarned is forearmed - by acting now you make use of short window of opportunity to become sustainable
- Less susceptible to extreme events (droughts) & other risks
- Be part of target group that receive priority service from service providers from various tiers of government
- Resultant stable environment provides opportunity to capitalise on other sources of income linked to biodiversity
- Act pro-actively before legislation becomes prescriptive. SA has obligations to international climate change mitigation frameworks

Resource List & References

Beginners Guide to UNFCCC

South Africa National Biodiversity Strategy and Action Plan (*See Adaptive Strategy for Biodiversity*)
Western Cape Provincial Climate Change Policy & Strategy

Bewaringsboerdery handleiding – Dept Agriculture – Copies of CD
Andre Roux
andrer@elsenburg.com

Good Agricultural Practices - Dept Agriculture - Charl Van Rooyen

Additional Reading

[Recommended further reading: www.ihdp.org](http://www.ihdp.org) (International Human Dimensions Programme)

CapeNature's Fact Sheet: A landowners guide to MANAGING BIODIVERSITY IN AN AGRICULTURAL LANDSCAPE

