FARMING SUNLIGHT

Preparing for

Climate Change in the

Succulent Karoo 2008





Knowledge is Power

The climate we live in influences many areas of our lives. If our climate changes and we are unprepared, our very basic needs such as access to food and water will be affected. In addition we will also become more exposed to certain health risks, as well as natural disasters such as floods.

Climate change is likely to have an unequal impact on the world population. Experts say those living in poor and developing countries are going to be less able to adapt to changes because of a lack of resources and poor access to information.

The Succulent Karoo Region does not have to be a developing country statistic.

The first steps to dealing with the known and unknown risks of climate change are to acquire information, spread the information and then collectively strategize.

We hope this resource book helps you begin that journey.

Why this introductory guide

Inhabitants of the Succulent Karoo who have lived in the region for a long time have noticed that seasonal weather patterns are not typical or predictable anymore and have seen the effects of changing weather patterns on their livelihoods already.

Climate change is happening

There is no dispute –

Climate change caused by human activities is happening and people need to prepare for its impacts.

The effect of climate change increases the likelihood of extreme weather events such as droughts, floods and heat waves. The Northern and Western Cape provinces are predicted to be the two South African provinces most at risk of induced warming and rainfall change. This makes planning for the impacts of climate change in the Succulent Karoo region very necessary.

Increased pressures on people and their livelihoods

The people of the Succulent Karoo region depend heavily on natural resources, such as livestock, agriculture or eco-tourism for their livelihoods. These resources in turn depend on the weather. If we do not plan for climate change in the area, the poor and vulnerable will face a double burden of firstly losing their means of income and secondly dealing with other effects such as floods and fires, and damaged road or electricity infrastructure.

Increased pressures on the natural environment

At present 936 plant species, 17% of the total number of plants that occur in the Succulent Karoo, are listed as threatened by the IUCN Red Data List. If we don't prepare for the coming increased temperatures and rainfall changes in this region we may lose many species of this already threatened biome.

How do we begin to prepare ourselves?

How do we begin to prepare ourselves? The first step is to get information about climate change and then to strategize using this information. This introductory guide is part of a larger information campaign. A website dedicated to sharing information on climate change adaptation strategies for the Succulent Karoo can be found on **www. climatetalk.org.za** where you will be able to share your experiences; learn from others and in this way build a new community of practice that will reduce the vulnerability of the people of Succulent Karoo to the inevitable changes that will come with global climate change.

Knowledge is power.

Contents

Who should use this guide?

If you live in the Succulent Karoo,

then this booklet is for you!

Or if you are a businessman, a farmer, if you run a guesthouse, or work in the community or are involved in the following issues:

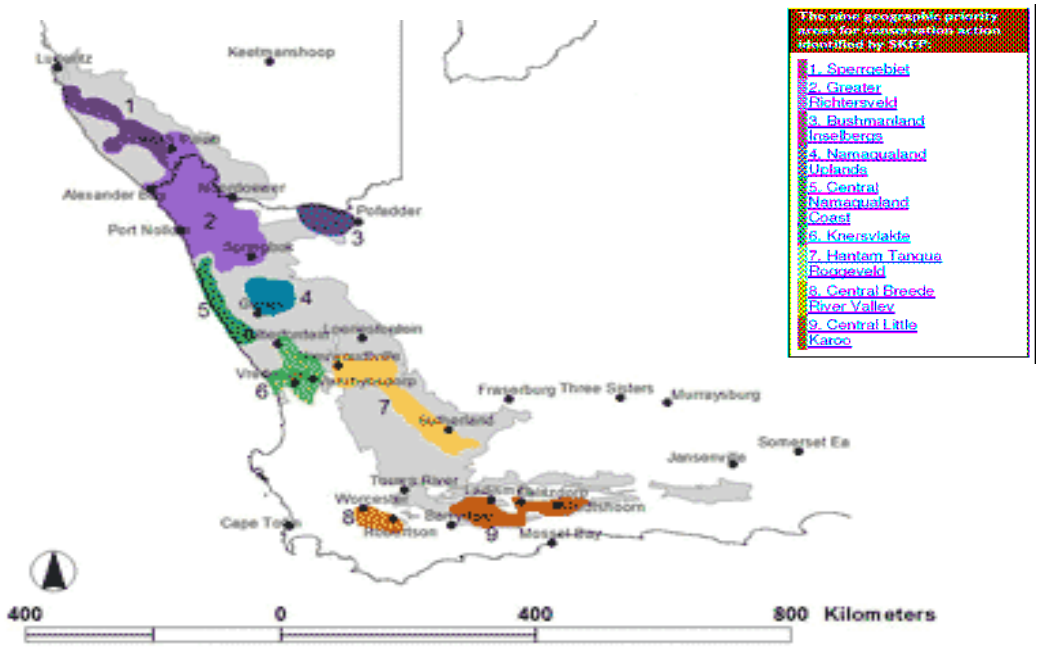
- *Rural development*
- *Agricultural support*
- *Community development*
- *Tourism and small business development*
- *Biodiversity*
- *Sustainable Livelihoods and*

Snapshot of the Succulent Karoo Region

This region is already vulnerable

People and the economy:

- It has very few people - only 300,000 people in 100 000 km^2.
- It has high unemployment and there is a trend of people moving to cities
- The people depend on natural resources – supported by livelihoods of agriculture, (particularly livestock), tourism (based on indigenous flowers and landscapes), and mining
- Most of the region is used for communal or commercial livestock grazing.
- It is a water stressed area
- It has recent experience of extreme floods, droughts, dust storms and other unusual or out of the ordinary weather phenomena



Biodiversity & natural resources

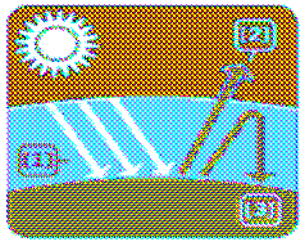
- The Succulent Karoo is a special place for plants – it has over 6000 plant species, of which about 2400 are endemic (i.e., occur only in this area and nowhere else in the world). However very little (3.5%) of the biome is formally protected in conservation areas.
- The biodiversity of the region is under threat currently from mining (particularly in the Namibia Gariep and Namaqualand areas) and extensive crop agriculture (in the southern Karoo).
- Existing conservation areas are 'islands' which do not include a range of climatic and environmental conditions to allow plants and animals to move in response to seasonal and long-term climatic changes.

"Kelkiewyn birds migrate normally in winter but now are seen the whole year round." (Succulent Karoo naturalist)

"Bababoudtjies" of the desert

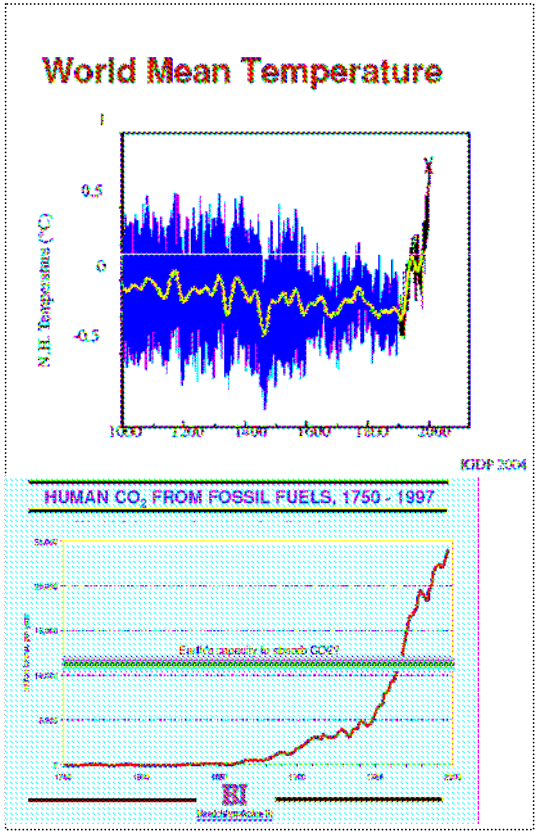
The plants of the Succulent Karoo have formed their own adaptations to the desert-like conditions of this region. For example, the succulent "vetplant" (or bababoudtjie) stores water in its fleshy leaves and when the rains leave in summer, it shrivels up and waits for winter! During the hot summery days, it coats its leaves with a soft waxy sunscreen, ideal to protect those soft fleshy leaves from the harsh sun. Its shallow roots soak water up from just below the ground where mist has dripped down. It also has a special seed pod that peels open when the rains come and the seeds are popped out when raindrops splash on them.

What is climate change and climate change adaptation?



What is Climate Change?

- Climate change is the natural cycles of weather patterns on earth resulting from changes in the amount of heat received from the sun. The climate goes through warm and cold periods, taking hundreds of years to complete one cycle.
- These changes affect the temperature which also influences the rainfall. Plants and animals are able to adapt to a changing climate if these changes take place over hundreds of years.
- Unfortunately, human activity is currently causing the climate to change too fast.
- Science has shown that climate change is already taking place and that most of the warming that has occurred during the past 50 years is due to human activity (IIPC, 2001).
- Climate models predict that the average air temperature over South Africa will increase by an estimated ***2°C*** over the next 100 years.
- Plants and animals may not be able to adapt as quickly to this "rapid" climate change as humans can, and therefore the whole ecosystem is in danger.



What causes climate change?

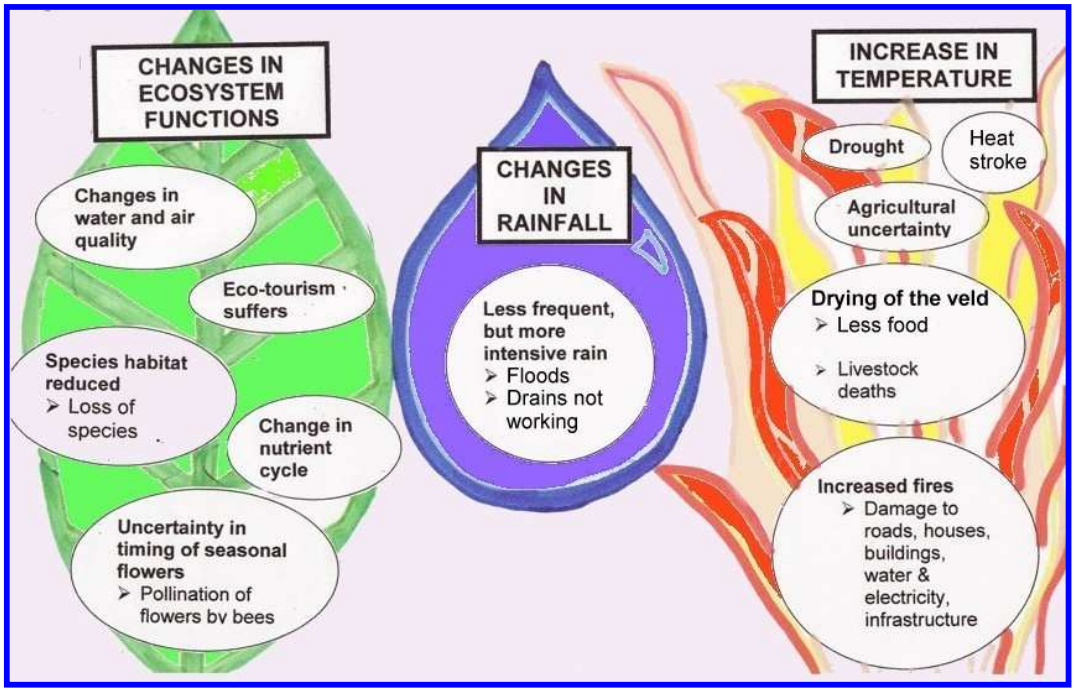
- The earth's climate system is driven by heat energy from the sun. Several gases in the atmosphere act to trap the energy from the sun, thus warming the earth. These gases are called greenhouse gases and the process is the greenhouse effect. Without this there would be no life on earth (see the picture above).
- Human activities over the last 200 years, particularly the burning of fossil fuels (oil, coal, natural gas) and the clearing of forests, have increased the concentration of greenhouse gases in the atmosphere. This means more heat is being trapped, which leads to the earth's surface warming up.

What is climate adaptation?

- In recent years reducing vulnerability of people to climate change has become an urgent priority in developing countries. Adaptation is a process whereby individuals and communities seek to cope with the consequences of climate change. Adaptation is about finding ways to lessen the impact of climate change on people's livelihoods.
- This process is not new, throughout history people have adapted to changing climate conditions.
  What is new is that now the changes will be *rapid and severe* and our dependence on technology and infrastructure will make us more vulnerable to the impacts of climate change. People used to depend mcuh more on community and low tech ways of living and these simple things used to help us out in times of shocks and stresses caused by climate change. Maybe it's time to change our lifetsyles – to return to a more sustainable way of life.

"The average temperature along the Orange River is between 25°C and 30°C. The current temperatures are between 35°C and 42°C."
(Department of Agriculture, Succulent Karoo)

Expected Impacts Worldwide



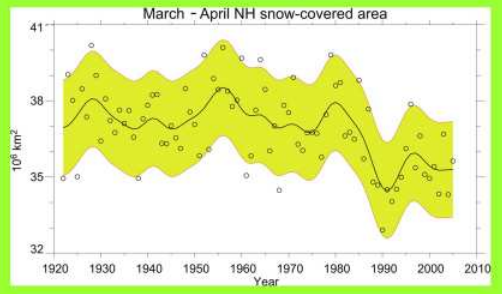
The most vulnerable communities are those who depend on production and distribution of climate restricted commodities. Economic diversification is the key adaptation mechanism. (IPCC)

Increase in extreme climate events may lower crop yields by:

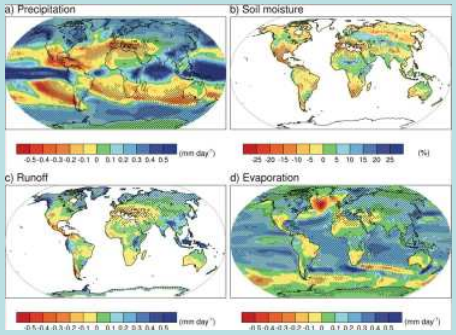
- *directly damaging crops at sensitive stages in their life cycle*
- *heavy rains causing erosion,*
- *too much moisture in the soil causing plants to die*
- *Higher salinisation of soil due to loss of moisture below root zone,*
- *frequency of frost at critical growth stages*
- *temperature thresholds exceeded during flowering (IPCC)*

In national parks, if no migration is possible, it is predicted that 10-15% of mammal species will go extinct or endangered by 2050 because of climate change. By 2080, 25-40% will be extinct or endangered. Even with unlimited migration, an average of 20% will become extinct or rare (IPCC).

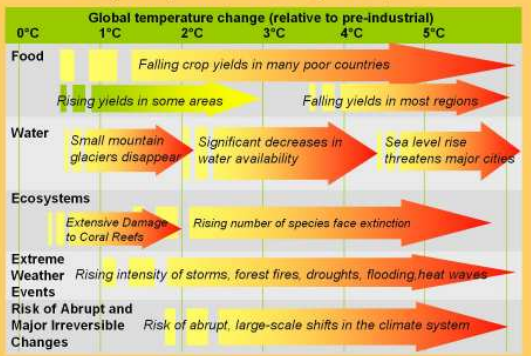
Decrease over time in the Northern Hemisphere snow-covered areas



Changes in precipitation, soil moisture, runoff and evaporation globally.

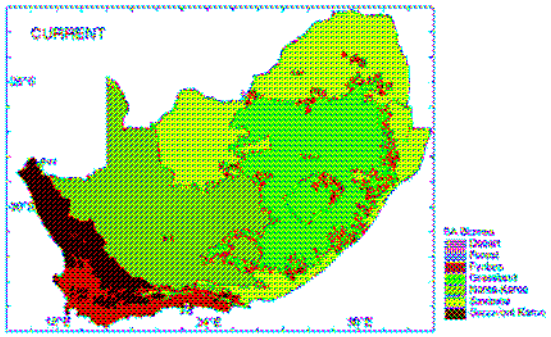


Changes to expect with increases in global temperatures



How will we experience climate change in South Africa in the Succulent Karoo?

- **HIGH TEMPERATURES**: January temperatures are expected to increase by 2.5 – 4.5°C in the central interior and Northern Cape and by 0.5 – 1.0°C at the coast. Warmer and drier climates will reduce our species richness and potentially increase alien invasive species and fire frequency and danger.
- **WATER RESOURCES**: Less rainfall or an increase in evaporation (due to higher temperatures) would further strain the already limited amount of water for agriculture, homes and for industry. The Western Cape can expect less winter rainfall, more summer rainfall and a shift to more irregular and intense rainfall with rising temperatures. The Western Cape may lose as much as 35% of its current winter rainfall. We can expect competition for fresh water to increase sharply. Less water in rivers will have an impact on wetlands. Sea level rise is expected and an inflow of saltwater will occur into coastal aquifers (groundwater).
- **GRAZING LIVESTOCK**: Higher carbon dioxide will lead to less protein in the grass, which will reduce any benefit resulting from increased plant growth. Less rainfall would lead to proportionately less animal production.
- **BIODIVERSITY**: Plants, in particular, have trouble keeping up with rapid climate change. Small populations of plants could go extinct as a result. Within 50 – 100 years, areas that support Succulent Karoo vegetation today will become so dry that only the hardiest plants will be able to survive (see the map on the right).
- **EXTREME CLIMATE EVENTS:** Major floods that have only happened before say, every 100 years on average, may now start to occur every 10 or 20 years. The flood season may become longer and there will be flooding in places where there has never been any before.



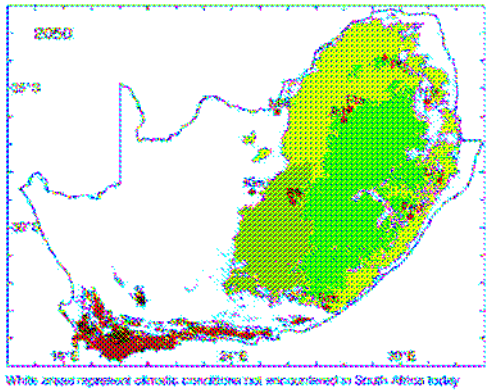


Figure 1. Current and predicted future distribution of biomes in South Africa. The future scenario is based on climate changes brought on by an increase in the concentration of atmospheric carbon dioxide to 550 ppm.

We will see different impacts and results of climate change in different areas making the task of planning very difficult. More detailed studies have to be made to determine more localised impacts in the Succulent Karoo region.

"It will be chaos, we will have sandstorms, shorter rainfalls, temperatures will rise, and fights will start over land and water."(Agricultural researcher of the Succulent Karoo)

"Traditional cattle farmers are now changing towards ecotourism as grazing has become problematic." (Succulent Karoo conservationist)

"With the floods the area has experienced there has been a shift of focus in service delivery - more work is needed on the road infrastructure, after heavy rainstorms." (Municipal manager in the Succulent Karoo)

Planning for Change

AGRICULTURE

CROP FARMING

Land preparation:

• Roughen the soil surface to minimize evaporation

Crop choice and planting:

• Choose suitable cultivars as a precautionary measure (e.g., those with broader leaves, hardier etc.)
• Follow the weather and climate forecast regularly to decide on when to plant
• Stagger planting - spread over weeks
• Always practice crop rotation

Crop management:

• Practise mulching to minimise evaporation (placing organic matter over soil)
• Control weeds regularly
• During drought do not over-fertilize
• Use organic fertilizer
• Irrigate during cool conditions to avoid water loss.

LIVESTOCK FARMING

• Avoid overstocking, control your stock to suit your camps and availability of feed. • Keep well adapted breeds of livestock
• Maintain best young females
• Feed pregnant and lactating animals better
• Force animals to use rangeland before providing other feed
• Postpone mating period during drought.
• Eradicate invader plants.
• First graze areas where vegetation has already shed leaves
• Plant hardy trees/shrubs for browse
• Sell surplus stocks and cull poor producers to save feed stocks.

"Emerging farmers can no longer farm with cattle with too dark a skin. This causes the cattle to suffer too much in the heat. Light skin cattle get sun burn." (Succulent Karoo emerging farmer)

WATER RESOURCES:

• Strict groundwater management systems should be put in place

with early warning systems to report overuse of groundwater reserves.

FIRE CONTROL:

• Ensure that firebreaks are in place.
•An owner of the land must prepare and maintain a firebreak (National Veld and Forest Fire Act No. 101 of 1998).
• Farming communities should establish fire protection associations to prevent and control veld fires.

FLOOD CONTROL:

• Ensure a proper drainage system – silted and blocked drains must be cleaned constantly to ensure proper water irrigation.
• Wetlands play a crucial role in flood control. The construction of levees and dams on rivers to improve flood control has often had the reverse effect. . Flood-plain restoration and the removal of obstruction partly solved the problem in many countries.
• Develop a flood monitoring system that uses a church bell to warn communities of coming floods. Every town has a church so this low cost intervention could help people prepare.

MUNICIPAL SERVICES:

• Climate-induced impacts on water resources should be integrated into the local IDP to reduce future risk.• Incentives: rebates for ratepayers and businesses that install rainwater tanks, re-use their grey water and install low-flush toilets
• Regulations: all new buildings be equipped with water-saving devices such as low-flush toilets and rainwater tanks
• Water harvesting: the installation of rainwater tanks in homes and commercial buildings
• Modification of catchment vegetation: the Working for Water Programme aims to remove water-thirsty invasive alien tree species from catchments in South Africa.
• Ensure ongoing monitoring and warning of impending disaster risks, with the help of the provincial weather and hydrological monitoring stations• Reducing the impacts of these natural hazards through infrastructural means, such as flood detention ponds and weirs
• Ongoing maintenance of stormwater drains

Source: Mukheibir, P. and Ziervogel, G.(2007)

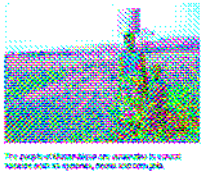
Lessons from Africa

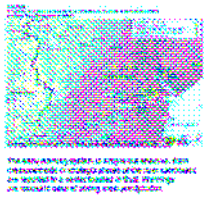
The People-Centered Mozambique Flood Warning System

Mozambique has been devastated by floods in the recent past. As a result, a simplified early warning system has been set up, to help the local villagers on the floodbanks of the Búzi river. Villagers are nominated for the job of measuring daily rainfall levels at strategic points in the Búzi river basin. Water levels along the river are also measured regularly using straightforward gauges. Members of the local disaster prevention teams read the measurements every day. They have been trained and chosen specially to do this job, which makes them feel very responsible. A national radio frequency is reserved for the flood reports and warnings.

- If there is particularly heavy rainfall or the water level becomes critical, this information is passed on by radio. Should reports indicate widespread heavy rainfall, the alarm is raised.
- The people living in the area undergo special training to alert them to the dangers. Helpers chosen beforehand are sent out with loudspeakers to raise the alarm. Areas at risk of floods are evacuated.
- Local disaster prevention teams have been formed in a number of Búzi river basin villages.
- The people in the village are informed in meetings at the local meeting points. This helps keep the awareness alive

Source including photos: Wolfgang Stiebens, DRM Advisor in Mozambique, PRODER-DRM/GRC; 2005





KENYA:

The RAdio InterNET (RANET) is a clever way for rural communities to receive weather and climate information in languages they understand. RANET system uses digital radios and solar energy panels for energy supply. A Community Based Organization (CBO) in each rural area uses a digital radio receiver and a computer to download RANET web content directly to the hard disk of a computer. They then access weather and climate predictions and advice from the national weather service in partnership with a team of experts from agriculture and other fields, who add advice about how to apply weather forecasts to farm planning. The CBO then gives this information to the rural communities to use on agriculture, livestock and health management. RANET also uses community based FM radios to pass information to communities within a radius of about 25km.

Source: Adaptation Lessons Learnt In Kenya On Climate Variability And Change Samuel W. Muchemi Kenya Meteorological Department

Graphic Source: RANET.net

South Africa: The Environmental Monitoring Group, with the University of Cape Town and Indigo Development and Change, developed sustainable harvesting guidelines for small-scale rooibos tea farmers. During a severe drought between 2003 and 2006, local farmers suffered losses of cultivated rooibos crops of between 60 – 100\%. In comparison, most of the wild rooibos bushes growing on these farms survived the severe drought conditions. Because wild rooibos is more drought-resistant than cultivated varieties, its management as a sustainable resource can increase the resilience of farmers to climate change. Other guidelines include ploughing in ways that ensures that moisture is retained on the land, and not nwashed away with valuable topsoil. Natural vegetation strips should be retained or established to act as windbreaks and biodiversity-rich buffers in rooibos plantations. Restios can be planted in strips on rooibos croplands to break drying winds.

Ethiopia is piloting a unique food safety net to climate proof their rural poor. The Productive Safety Net Programme (PSNP) targets people facing predictable food insecurity and offers guaranteed employment for 5 days a month in return for transfers of cash. They have also attempted to build resilience of the small holder farmer to climate shocks by building community assets through public work works such as construction of schools, health post and feeder roads, potable water development; small scale irrigation and natural resource conservation – contributing gradually to improving the livelihoods of the poor.

Resources

Climate change information is rapidly changing; keep up to date by visiting tehse websites and/or contacting these key organizations.

I want to know more about the science of climate change:
Dr Gina Ziervogel: Email: gina@egs.uct.ac.za, Tel: (021) 6504796
www.egs.uct.ac.za/~gina/
Dr Peter Johnston: climate@egs.uct.ac.za Tel: (021) 650 2784
Dr Guy Midgley: info@sanbi.org, www.sanbi.org/frames/gcrg.htm

I want to know who to contact in a climate change-related disaster:
The Directorate Disaster Management and Fire Brigade Services, Schalk Carstens, Tel: (021) 483 5016, swcarste@pgwc.gov.za

I want to know who to call if I plant rooibos and am worried about climate change:
Environmental Monitoring Group, Noel Oettle, dryland@global.co.za, http://www.emg.org.za/

I want to know who to call in nature conservation about climate impacts on plants and animals:
Corne Claassen, Cape Nature (Vrolijkheid), (023) 625 1621, Cclaassen@capenature.co.za
SKEP *(Succulent Karoo Ecosystem Programme)* Telephone: 021 799 8872 Fax: 021 797 1940
www.skep.org
C. A. P. E (Cape Action for People and Environment): (021) 799 8790
Gouritz Initiative, Susan Botha: (044) 2036326

I want to know how my water supply might be affected by climate change:
Department of Water Affairs, Clanwilliam Office, (027) 4822233

I want to find out more about how my community might be affected:
Indigo Development & Change, Nieuwoudtville, Tel: (027) 218 1148, email: info@indigo-dc.org
Bitterfontein Advice and Development Organization, Cavin Bezuidenhout, (027) 642 7340, badodma@webmail.co.za
Climate Change and social development network: http://www.southsouthnorth.org/

I want to find out who to call to determine how my tourist business will be affected by climate change:
Matzikama Tourism Association, Christo Paulse, (027) 219 1559, vanrhynsdorp@matzikama.co.za
WDM-Hardeveld Tourism Centre, Malinda Gardener, 027 216 427 335, hardeveldtour@telkomsa.net
Oudtshoorn Tourism Bureau, Cyril Clarke, (044) 279 2532, info@oudtshoorn.com

Go to the Green Connection website (www.thegreenconnection.org.za) for links to SKEP, and to the Climate Change Communication Campaign website – www.climatetalk.org.za
Intergovernmental Panel on Climate Change: http://www.ipcc.ch/
International Climate Adaptation network: http://www.climateadaptation.net/
WWF International NGO looks at Climate Change: http://www.panda.org.za/climatechange/
SA Study on Climate Change: http://www.sanbi.org/countrystudy/main.htm
SA Scientist: Climate Systems Analysis Group: http://www.csag.uct.ac.za/
University of Cape Town Research on Climate change: http://www.erc.uct.ac.za/
South African Climate Action Network: http://www.earthlife.org.za/SACAN
Department of Environmental Affairs and Tourism:
http://www.environment.gov.za/ClimateChange2005/home.htm

Legislation dealing with climate change

1. *Municipal Systems Act* (Act No. 32 of 2000) has obligations for environmental management by local government.
2. *National Water Act* (Act No. 36 of 1998) and *Water Services Act* (Act No. 108 of 1997) addresses the management of water resources.
3. *National Environmental Management Act* (Act No. 107 of 1998) develops strategies to protect natural and cultural resources and proactively address poverty.
4. *Disaster Management Act* (Act No. 57 of 2002) focuses on preventing and reducing the risk of disasters, mitigating their severity, emergency preparedness, rapid and effective response and post-disaster recovery.
5. *Biodiversity Act* (Act No. 10 of 2004) aims to provide a regulatory framework to protect South Africa's valuable species, ecosystems and biological wealth.
6. Furthermore, as a party to the *United Nations Framework Convention on Climate Change* (UNFCCC), South Africa has to fulfil certain obligations in terms of adaptation, public health and the quality of the environment.

I want to contact my municipality to find out how they are prepared for climate change in my area:
West Coast District Municipality, Sive Mabula – (022) 4338484
Matzikama Local Municipality, General Enquiries – (027) 2013300
Central Karoo District Municipality, H. Rust – (023) 4910000
Breede Valley Local Municipality, Eric Tshandu – (023) 3482600
Oudtshoorn Local Municipality, General Enquiries – (044) 2033000

I want to know who in agriculture can help me prepare for climate change:
ARC Institute for Soil, Climate and Water. Tel: (012) 310 2500, info@iscw.agric.za, www.agls.agric.za
DoA, www.nda.agric.za: Elsenburg (research): (021) 8085111
Moorreesburg/Swartland: (022) 4332272
Vredendal/Matzikamma: Paul Herselman, (027) 2132000, paulh@elsenburg.com
Worcester/Breede Valley: (023) 3471121
Oudtshoorn/Eden: Stefan Pieterse, (044) 044 2726077, stefanp@elsenburg.com
Springbok: Vinal Coetzee, (027) 7121315, Vcoetzee@agri.ncape.gov.za
Agricultural Research Council (ARC), Kamiesberg (Research) – (012) 4279700 /0800 427000

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