

Water, drought and the changing rains

Africa is already persistently affected by drought. Local droughts occur every year and continental crises seem to occur once a decade, or more recently, twice a decade. Although the continent uses only around four per cent of its renewable freshwater resources, “Water is becoming one of the most critical natural resource issues.”³²

Currently around two-thirds of the rural population and one-quarter of the urban population lack access to safe drinking water, and the number of people suffering from water stress or scarcity is rapidly increasing as a result of urbanisation, increased economic development and population growth.³³ According to the United Nations Environment Programme (UNEP) currently, “14 countries in Africa are subject to water stress or water scarcity,” and “a further 11 countries will join them in the next 25 years”.³⁴ Between 1970 and 1995, Africa experienced a 2.8 times decrease in water availability.³⁵

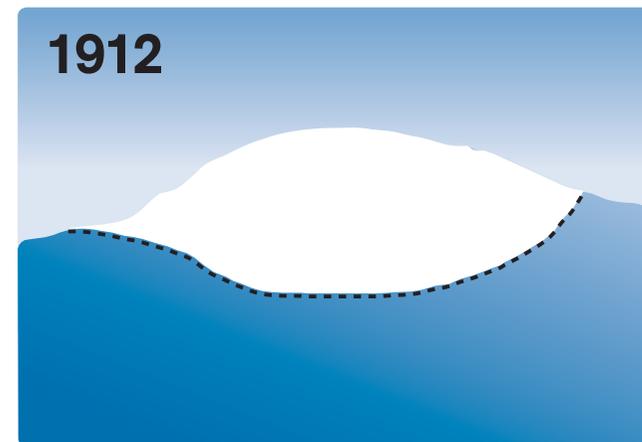
Africa’s coastal area already experiences the environmental problems of coastal erosion, flooding, and subsidence. Exploitation of coastal resources, development and population pressures are all involved. Climate change is expected to intensify these problems. The IPCC predicts, “Climate change will exacerbate existing physical, ecological/biological, and socio-economic stresses on the African coastal zone.”³⁶ With Africa’s overwhelming dependence on rain-fed agriculture, the fate of its people is exceptionally sensitive to disruptions in the hydrological cycle.³⁷

Expected impacts

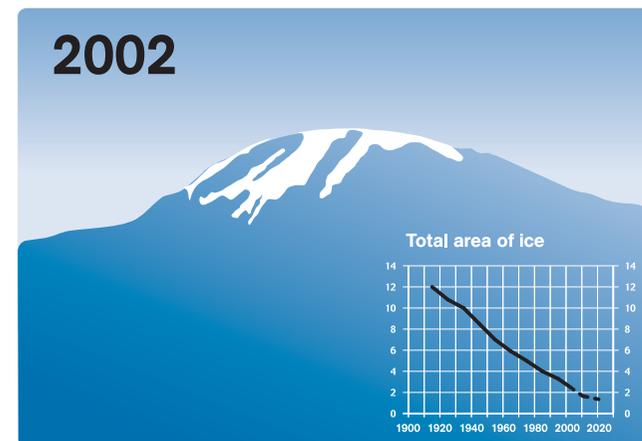
Climate change is expected to intensify Africa’s increasingly critical water situation, with southern Africa being one of many water-stressed regions which could see a further decrease in the flow of streams flow and the ability of groundwater to ‘recharge’.³⁸ Reduced annual average rainfall and its run-off would worsen desertification in southern Africa.³⁹

Africa, like everywhere else, relies on water for its social, economic and environmental well-being. But the fact that so many have subsistence livelihoods means that prolonged drought represents a serious climate related hazard for the continent. Take just one example of the domino effect that the symptoms of global warming could have. First there is a drop in water level in reservoirs or rivers in areas where rainfall drops. Then the quality of water goes down because sewage and industrial effluents become more concentrated, thereby exacerbating water-borne diseases and reducing the quality and quantity of fresh water available for domestic use.

The melting snows of Kilimanjaro



Glaciers Ice Estimated line



(Sources: Meeting of the American Association of the Advancement of Sciences (AAAS) February 2001; Earthobservatory.nasa.gov)

In the Nile region, most scenarios estimate a decrease in river flow of up to more than 75 per cent by the year 2100. This would have significant impacts on agriculture, as a reduction in the annual flow of the Nile above 20 per cent will interrupt normal irrigation.⁴⁰ Such a situation could cause conflict because the current allocation of water, negotiated during periods of higher flow, would become untenable. Although the IPCC states that the “potential effect of climate change on drought in Africa is uncertain”, it also asserts that “It seems prudent to expect drought in Africa to continue to be a major climatic hazard”, observing that even a small decrease in precipitation combined with higher evapotranspiration could result in “significantly greater drought risks”.⁴¹ Consequently, the IPCC recommends the improvement of water use and irrigation systems in Africa, which would, regardless benefit the region.

Living with climate variability and uncertainty in southern Africa

“Seasons have been irregular in certain regions and there are no precise times for planting as there used to be. Crop yield has reduced drastically, sometimes resulting in total crop failure, and high yielding variety crops are no longer grown. There is no longer food security which results in high food prices, malnutrition, and poverty.”

Development group MOUCEORE, Rwanda

From the level of the individual, to the community, and to the nation, people have had to cope with climate variability and climate change for centuries. So, in order to better understand how societies may adapt to future climate change, it is necessary to understand human behaviour and decision-making as well as climate science. The Adaptive research project investigated farmers’ perceptions of, and responses to, changes in the summer rainfall area of South Africa.⁴²

For farmers in South Africa, the concepts of ‘drought’ or ‘extreme rainfall’ are not necessarily sufficient to capture the dynamics of climate variability. Factors such as: the *timing* of the onset of first rains (which affects when crops are planted), the *distribution* of rainfalls within the growing season, and the *effectiveness* of the rains, are all real criteria that affect the success of farming. Therefore better drought forecasting *per se* may not be enough to help people cope with climate uncertainty and change.

Individual people in the case study areas showed an acute awareness of the changing climate trends around them. Where repeated exposure to an event has occurred, such as drought in Mantsie, familiarity and experience mean it can be viewed very differently from other ‘surprise’ events (like flooding), which occur less often. As one farmer said:

“Drought is easier to cope with because we are used to it, the heavy rains are not good because we need a little and often.”

Table 1: Climate characteristics for the three study areas in South Africa

Climate parameter	 Limpopo Province (northern area)	 NW Province (west of Mafikeng)	 KwaZulu Natal (eastern area of the northwest of the province)
	Case study village: MANTSIE	Case study village: KHOMELE	Case study village: eMCITSHENI
Long-term mean annual rainfall	400–500mm	500-600mm	800-900mm
Onset of season characteristics	Growing length of dry season, later start to wet season in October to early November	Early wet season rain days have been increasing (Sept-Oct)	Highly variable and increasingly uncertain. Increase in early season rains with parallel decline in late season rains (Feb-March) for some years.
Within season characteristics	Within wet season a trend towards fewer rain days in Nov and Dec and an increase in overall occurrence of dry spells	Variability in rainfall amounts and distribution with no specific wetting or drying trends identifiable	Higher rainfall in first half of growing season, characteristically heavier rainfall events with lower rainfall events later in the season.
Drought frequency	Frequent in the last two decades: 1982-3, 1987, 1990 and 1994	Regular over the last 50 years	No trend

And climate really matters. Amongst all the disturbances that affect African societies today, including the impact of HIV/AIDS and political disturbances, local people say climate change is significant.

The Adaptive work identified differing types of response to climate variability and change, outlined in Table 2. The strategies are either means of simply getting by, or *coping*, or represent real forms of *adaptation* to the changes in rainfall. Some of these responses, such as diversifying livelihoods, are not unique to climatic upheaval, but importantly were clearly identified by rural people themselves in this study as *deliberate* responses to climate triggers. The following definitions of what is ‘coping’ and what is ‘adapting’ also come from the people themselves.

Table 2: Impacts of, and responses to, locally identified climate parameters in the study villages

Mantsie

Parameters identified by focus group	Perceived impact	Range of responses – rapid (coping) and longer-term (adaptation)
Little rain	<i>On welfare of household</i>	<i>Change a farming practice – coping</i>
Breaks in rainy season	<ul style="list-style-type: none"> ● Hunger ● Demands from family and friends for food ● Sickness and tiredness 	<ul style="list-style-type: none"> ● Buy salt ● Store fodder ● Go to town to buy more seeds
	<i>On natural resource-based livelihoods</i>	<i>Spatial/temporal diversity – adapting</i>
	<ul style="list-style-type: none"> ● Crops die ● Loss of seeds ● Less fodder for animals to eat ● Debt (money owed from ploughing) ● Young animals die ● Less grass 	<ul style="list-style-type: none"> ● Eat wild fruits ● Look at plants and birds to decide what can be planted when and where ● Buy short-maturing crop varieties ● Take small stock to river area or other villages
		<i>Commercialising – adapting</i>
		<ul style="list-style-type: none"> ● Sell your animals ● Try to start a business ● Travel to town to find work
		<i>Networks – coping and adapting</i>
		<ul style="list-style-type: none"> ● Send someone from the community to ask the Government what they will do to help ● Go to church ● Ask family elsewhere to help ● Collect your welfare payments/food ● Steal

Khomele

Parameters identified by focus group	Perceived impact	Range of responses – rapid (coping) and longer-term (adaptation)
Less rain	<i>On welfare of household</i>	<i>Change a farming practice – coping</i>
Period of no rain	<ul style="list-style-type: none"> ● Tiredness and hunger 	<ul style="list-style-type: none"> ● Grind maize stalks as feed ● Use resistant yellow maize ● Plant late-maturing fruit trees
Unpredictable rain	<i>On natural resource-based livelihoods</i>	<i>Spatial/temp diversity-adapting</i>
Rain out of season	<ul style="list-style-type: none"> ● Seeds do not germinate 	<ul style="list-style-type: none"> ● Use irrigated land ● Eat wild fruits ● Work land in other places ● Cut fodder from ironwood trees and collect seeds from wild plants
Late rain	<ul style="list-style-type: none"> ● Makes soil more unproductive ● Affects planning – cannot tell the rainfall patterns by flowers on wild plants ● Poor quality grass ● Livestock die ● Dryland crops die ● Pests proliferate ● Leaves change colour ● Less water for animals ● More thorn bushes 	<i>Commercialising –adapting</i>
		<ul style="list-style-type: none"> ● Gardening projects to improve food security ● Form groups to start new business venture ● Sell livestock, esp. at auction ● Look for piece work ● Plant winter crops ● Plant late-maturing fruit trees ● Breed indigenous species
		<i>Networks- coping and adapting</i>
		<ul style="list-style-type: none"> ● Ask for money from relatives ● Get help from government e.g. subsidised feed ● Have village meeting ● Local leasers decide what to do ● Advice from church ● Get medicines

Table 2 (Contd)

eMcitsheni

Parameters identified by focus group	Perceived impact	Range of responses – rapid (coping) and longer-term (adaptation)
Changing seasons	On natural resource-based livelihoods	Change a farming practice – coping <ul style="list-style-type: none"> ● Store fodder ● Build cattle shelter
Hail	<ul style="list-style-type: none"> ● No feed for animals 	Spatial/temp diversity-adapting <ul style="list-style-type: none"> ● Change type of vegetable or maize type
Drought	<ul style="list-style-type: none"> ● Makes soil more unproductive 	Commercialising – adapting <ul style="list-style-type: none"> ● Change type of vegetable or maize type (related to sale opportunities) ● Plant vegetables ● Sell livestock or goods ● Start projects ● Find work
Frost	<ul style="list-style-type: none"> ● Animals die 	Networks- coping and adapting <ul style="list-style-type: none"> ● Borrow from family ● Apply for government grant ● Have village meeting ● Pray at church ● Ask extension officer for information
Heavy rain	<ul style="list-style-type: none"> ● Can't afford to buy good seeds ● Can't sell crops ● Lack money (no crop/livestock sales) 	
Snow	<ul style="list-style-type: none"> ● No money for transport ● Crops die 	

The Adaptive project also found that some forms of response were occurring in all three areas. Commercialising small-scale agricultural production was important in all areas, creating a source of cash that can then be used flexibly to meet household needs.

The findings illustrate that concerns about the effects of climate change on rural societies are justified: climate change is happening, and it is affecting activities that depend on the natural environment.



Photo: Jim Loring/Tearfund

“The change in weather has affected agriculture to the extent that some vegetables don't now grow and we yield less vegetables per hectare. Also, there are more plant attacks by insects than before.”

Pastor Elie Kabore, Burkina Faso

However, far from being passive victims, people recognise even subtle changes in climate, and take steps to respond to them.

Some of these responses may be positively beneficial; some though, may be harmful, in the short or long term. Either way, people are making significant changes in their lives. Inevitably, there will be winners and losers in the process. Some people will adapt more successfully than others, and it may be that climate change will result in a polarisation of wealth and well-being in ways we have not seen before.

Rainwater harvesting in Gwanda District of Zimbabwe⁴³

Communal lands in Zimbabwe are often in areas that are marginal for producing food. Soils are poor and rainfall low. The Intermediate Technology Development Group (ITDG) has worked on the communal lands for 20 years, developing an approach to mobilising communities called Training for Transformation. The work on rainwater harvesting evolved to meet the communities' need to increase food production in a climate where people think that rainfall is reducing and becoming more unpredictable.



Contour ridge and infiltration pit under construction

Mrs Magaye, village co-ordinator of the agricultural production system in Humbane village in Ward 17 Gwanda North, describes the experience of incorporating rainwater harvesting.

“The first thing we did was to visit some farmers to learn from them. We went to Zvishavane and Chivi. We liked what we saw and when we came back, we called a ward meeting, so we could share our experience. Traditional leaders in the ward came together. We reviewed the challenges we are facing here and came up with a strategy. Our main challenges are food security and environmental degradation in open access areas. The first strategy was rainwater harvesting instead of allowing the water to run off. So farmers began digging contours. We got training from ITDG in pegging contours (using the A frame.) It is an affordable technology.

We realised if we just dug a contour, the water would overwhelm it, so we dug infiltration pits, to slow it down. Then we ploughed and sowed. Tilling the land was hard, because of a lack of donkeys and ploughs. In the dry season, donkeys don't have enough grass to eat and are weak. We approached the District Development Fund to ask to hire tractors. The cost is too high for most villages. We were able to pay enough to cover half a hectare for each farmer. Another challenge was how to help the elderly to work? Due to HIV/AIDS and migration of the area, there is a shortage of

able-bodied labour. So grandchildren took the place of elders. If an elderly person had no younger relative, others would dig on their behalf. The elderly can help, by praying, giving advice, and baby minding. We work together as a social responsibility to elders.”

Before the project, there had been no harvest, while last season, quite a few households harvested 500kg of maize. Twenty-five per cent of households in 2003 had produced enough food to see them through the year. Many of the other 75 per cent had joined the project later, or only committed part of their land to contour ridging, waiting to see how others fared.