

water, as well as the quality and quantity of water that is available and accessible.

Availability of water will vary within the country depending on physical characteristics and seasonal rainfall patterns. Population growth, urban expansion, increased irrigation demands and increased economic activity coupled with reduced runoff and high water loss through evaporation will put a strain on available surface and underground water resources.

#### Human Health

Disease vectors such as malarial mosquitoes will increase in intensity and expand into new regions of the country. Climate conditions will interact with weak health infrastructure to impose worsening disease burdens, mortality and morbidity among vulnerable socio-economic groups. Increased malnutrition and diarrheal diseases in some areas will increase vulnerability to extreme public health, and developmental goals will be undermined by longer-term damage to health systems from disasters.



#### Ecosystems

Degradation of productive local ecosystems will cause climate-affected populations to migrate in search of water, food and livelihood opportunities. This will greatly increase the pressure on remaining forests and agricultural



landscapes, further accelerating resource demands and environmental degradation.

#### Energy

Extreme temperatures (cold and hot) have a direct impact on energy demand. Future decreases in rainfall will have implications for the contribution made by Lake Kariba to the Zimbabwean economy. Lake levels are crucial for energy generation at the Kariba Dam. Reduced power output will increase demand for costly imports whilst loadshedding puts unsustainable pressure on forests as an alternative source of

energy.

#### Disasters

Climate change is likely to increase disaster risks through an increase in weather and climate hazards (particularly floods and drought). Vulnerability of communities to natural hazards is likely to increase, especially through ecosystem degradation, reductions in water and food availability, and changes to livelihoods. Natural hazards themselves do not cause disasters- it is the combination of an exposed, vulnerable and ill-prepared population with a hazard event that will result in disaster situations.

#### Industry, settlements and society

The most vulnerable industries, settlements and societies are generally those located in river flood plains and those whose economies/livelihoods are closely linked with climate-sensitive resources.



#### 9.0 Way forward

Climate change presents both risks and opportunities for Zimbabwe. The close relationship between agricultural performance and rainfall, and between the economy and agricultural performance are well established. Zimbabwe's high dependence on climate sensitive economic sectors, coupled with low adaptive capacity makes the country particularly vulnerable to impacts of climate variability and change. Climate change directly affects natural resources and the health of ecosystems on which human well-being depends. Economic and social development draws on the same assets. Without decisive measures that incorporate lessons learned from a range of integrated environment and development efforts, vulnerable populations and development objectives are in jeopardy. The fact that Zimbabwe is embarking on economic recovery programmes aimed at sustainable development and reduced poverty, among other UN Millenium Development Goals, provides an opportunity for integrating climate change policies in national development programmes. The challenge will be to continuously improve the climate change knowledge base, develop institutional capacity and an appropriate institutional coordination framework to guide climate change programming in the country.

f a c t s h e e t

# climate Variability and change in Zimbabwe



For more information

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Government of Zimbabwe



Environmental Management Agency



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Global Environmental Facility



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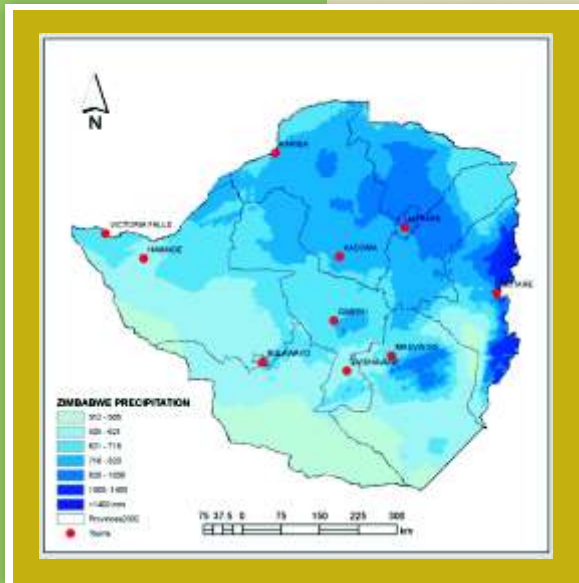
## 1.0 Introduction

This factsheet presents what is currently known about climate change and possible impacts in Zimbabwe.

## 2.0 Climate of Zimbabwe

### Rainfall

Zimbabwe receives national average annual rainfall of between 500 to 750 mm. Northern regions receive between 750mm to 1250 mm, whereas the eastern highlands get as much as 1 250 mm to 2 000 mm per annum. However, the south and southwest low-lying parts of the country have a rather dry climate with unreliable rainfall. These areas receive little amounts ranging from 250 to 500 mm per annum. The rainy season coincides with the time of high sun in the southern hemisphere and span the period November to March, though some significant amounts may occur in October and April.



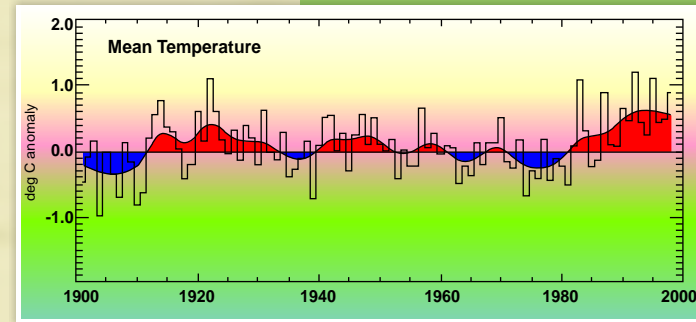
### Temperature

Temperatures are warm but rarely hot around the year, except in the lower regions where hot conditions dominate. The highveld has average temperatures that vary from 12-13°C in winter to 24°C in summer whereas in the lowveld (the Zambezi and Limpopo valleys), temperatures are usually 6°C higher in winter and average of between 32°C and 38°C in summer. Hours of sunshine average six to seven a day during the winter season and as much as eight to nine hours during the summer season.

## 3.0 Is our climate changing?

The earth's climate is always changing. The global temperature is warmer now than at any time since at least 1400 AD. Recent warming is evident both in observed air temperature and, indirect physical and biological records. Of note is that mountain glaciers are melting, the temperature of the ground has been increasing, and sea

## 4.0 How is our climate changing?



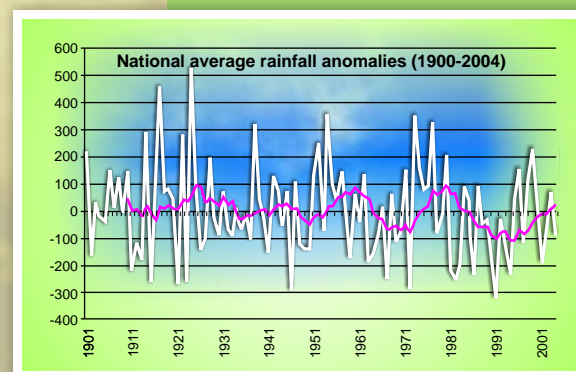
### Temperature

Zimbabwe is experiencing more hot and fewer cold days than before. The country's annual mean surface temperature has warmed by about 0.4°C from 1900 to 2000. This gives a warming rate of about 0.04°C every ten years. National average maximum temperature has warmed by about 1°C over the same period. From daily records, it can be concluded that the frequency of cold nights and cold days has decreased by about 1.2 and 1.1% per decade respectively (that is a reduction of four (4) cold nights and 1 cold day less every ten years) from the 1971-1995 reference period. Warm day frequency has increased by about 1.9% per decade (that is about seven (7) warm days more every ten years). The period from 1980 to date has been the warmest in the instrument record. Urban settlements have warmed at a slightly higher rate than the national average. However, other short warm phases are also evident around 1910 – 20s and 1935-40s. At global level, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report concludes that it is now "unequivocal" that the Earth's climate is warming.

Global average surface temperatures have warmed by 0.7°C since 1910. IPCC, 2007.

### Rainfall

The timing and amount of rainfall received are becoming increasingly uncertain. Rainfall in the country is variable from year-to-year and droughts have always occurred from time-to-time. However, the last thirty years (from 1980), have seen a trend towards reduced rainfall or heavy rainfall and drought occurring back to back in the same season. The period 1980 to 2000, as well as being the warmest in instrument record, has also been the driest. In addition, from 2000 to 2010, the length and frequency of dry spells during the rainfall season has been increasing while the frequency of rain days has been reducing. It has been generally observed that competing responses (such as increasing number of dry days, coupled with increases in rainfall intensity), working at



## 5.0 Why is the climate changing?

Observed climatic changes cannot be attributed to a single factor with absolute certainty. However, there is consensus among scientists that much of the warming after 1950 can be attributed to human activities such as burning fossil fuels and deforestation that have led to increased "greenhouse gas" concentrations in the atmosphere. Globally, atmospheric carbon dioxide (the most important greenhouse gas) levels have increased by 35% from pre-industrial times. The pattern of temperature changes associated with this global warming now suggest, according to the IPCC, " ... a discernible human influence on global climate".

According to the IPCC fourth assessment report (2007), global greenhouse gas emissions are mainly attributed to the following primary sources:

- Energy supply sector (26%),
- Industry (19%),
- Forestry (17%).
- Agriculture (14%), and
- Transportation (13%).

## 6.0 What are the observed impacts of climate change so far?

Impacts of climate change are superimposed on other socio-economic stressors.

Observed global impacts of climate change include:

- Rise in sea level
- Melting of glaciers and ice caps
- Change in weather patterns
- Changes in timing of spring events, such as leaf unfolding, bird migration and egg-laying
- Shifts in ranges and changes in algal, plankton and fish abundance in high-latitude oceans
- Range changes and earlier migrations of fish in rivers
- Changes in the behavior of various ecosystems

## 7.0 How will Zimbabwe's climate change in future?

Projections of future climate depend on the future level of heat trapping gases. Climate projections for Zimbabwe are for a warmer future climate. It is estimated that there will be:

- Warming of 0.5 to 2 °C by 2030 and 1 to 3.5 °C by 2070 compared to the 1961- 1990 average. These scenarios assume greenhouse emissions continue along the current increasing trajectory.
- Rainfall predictions for the country are less certain. However, various models suggest that rainfall patterns (onset and cessation dates, rainfall intensity, dry spells) are likely to change and extreme events are set to increase. Some models predict a 10-20% decline in rainfall by 2050.

What are "greenhouse gases?" These are gases in the earth's atmosphere that absorb and re-emit infra-red radiation emitted by the earth's surface. These include carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (Sf<sub>6</sub>).

## 8.0 What are the possible sector impacts of climate change?

### Agriculture

Increasing temperatures, changing seasons, and increases in frequency of droughts and floods will lower crop yields and livestock productivity, especially in already arid and semi-arid areas. Agricultural production in many areas will likely be especially hard hit, with yields declining by 20-50% by 2050 according to IPCC estimates. A fall in crop production leads to household food insecurity, loss of income generating capacity, sale of livelihood assets, a rise in poverty and increased dependency on food relief. Poor rainfall results in very poor pastures during the dry season, affecting the condition of livestock, especially cattle. Under increased drought frequency, the mixed farming model that relies on cattle for draught power may become less viable.



### Water

Rising global temperatures will lead to an intensification of the hydrological cycle, resulting in dryer dry seasons and wetter rainy seasons, and subsequently increased risk of more extreme and frequent floods and drought. Changing climate will also have significant impacts on the availability of

