Zimbabwe Meteorological Services Department

Climate Issues and Facts: Zimbabwe

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OUTLINE

INTRODUCTION

- Weather and Climate- Definitions
- Zimbabwe Climate
- Factors controlling Weather & Climate
- Weather related Hazards
- Climate Change facts- Zimbabwe.

Weather vs Climate

Weather

- is the state of the atmosphere at a given time and place. The atmospheric parameters include temperature, humidity, precipitation, cloudiness, wind, and barometric pressure.

In contrast to weather,

- **Climate** is the set of meteorological conditions that prevail in a particular place or region over a long period of time. Climate can vary over broad time scales, from years to millennia.
- **Climate** is the long-term statistical expression of short-term **weather**.

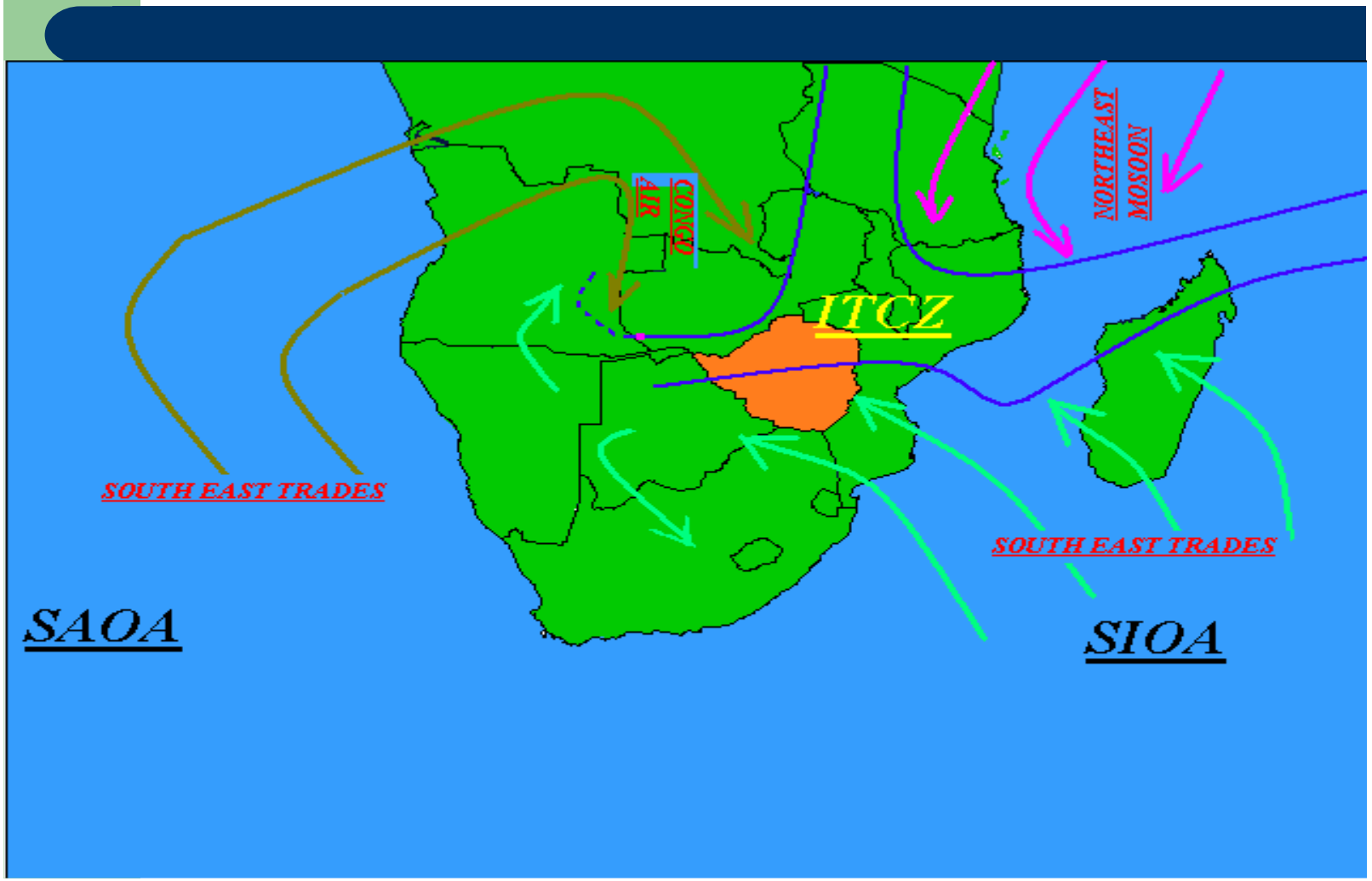
Zimbabwe Climate

- Hot Season - mid-August to mid- November (hot day time T℃ 26℃ to 36℃)
- Main rainy season - mid-November to mid-March (intercepted by 4 to 5 dry spells)
- Cool season - mid-May to mid-August (mild day time T℃ 20℃ to 29℃)
- Post rainy season - mid-March to mid-May (mild and sunny, 23℃ to 31℃)

Factors controlling climate

- Latitude which determines the amount of radiation received at any time of the year.
- Position in relation to land, sea and ocean
- Altitude which greatly influences temperature
- General circulation of the atmosphere and its perturbations.
- Nature of the underlying surface; soil type, water
- Vegetation cover
- Topographical features

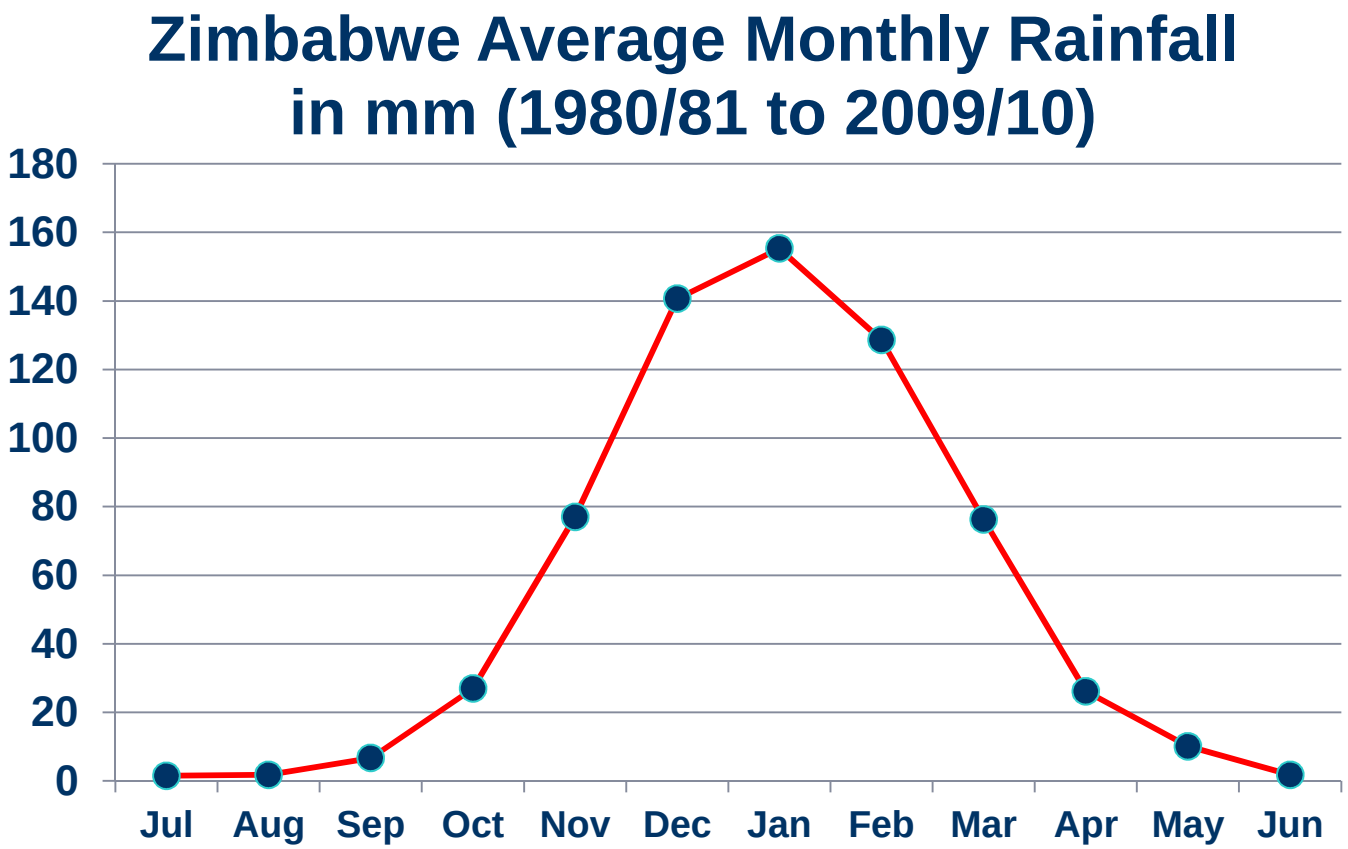
ITCZ – December/January/February



‘Guti’

- This is a cool moist southeasterly airflow which causes cloudy conditions. If this condition becomes well established it results in widespread drizzle and rain in places.
- In summer if a guti sets in, it results in convergence; hence increasing rain and thunder activity in the country if conditions allow.
- Severe guti may push crucial rainfall activity out of the country and drier weather will be experienced over whole country.

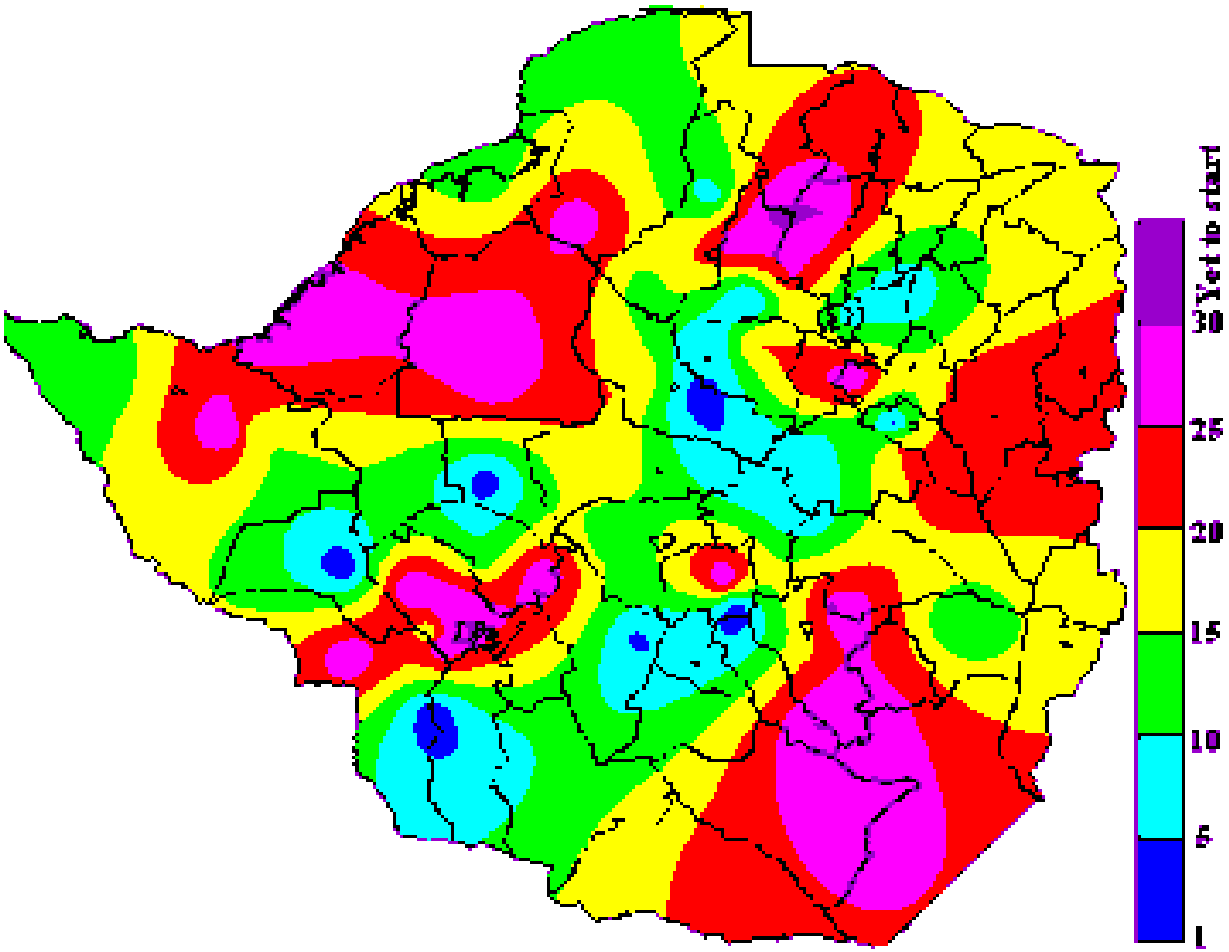
Main rain months



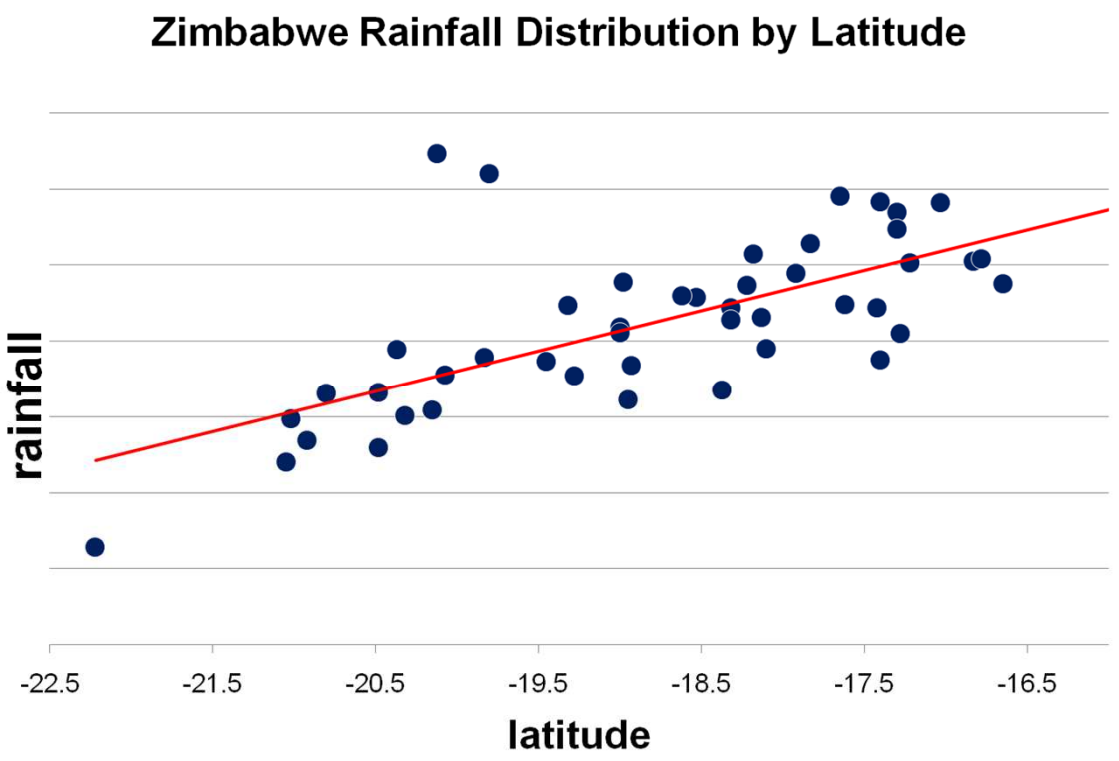
2010/11 Rain Season Onset

A start of the rain season is attained when a place receives 20 mm in 1 or 2 days and there is no dry spell of more than 10 days expected in the following 30 days.

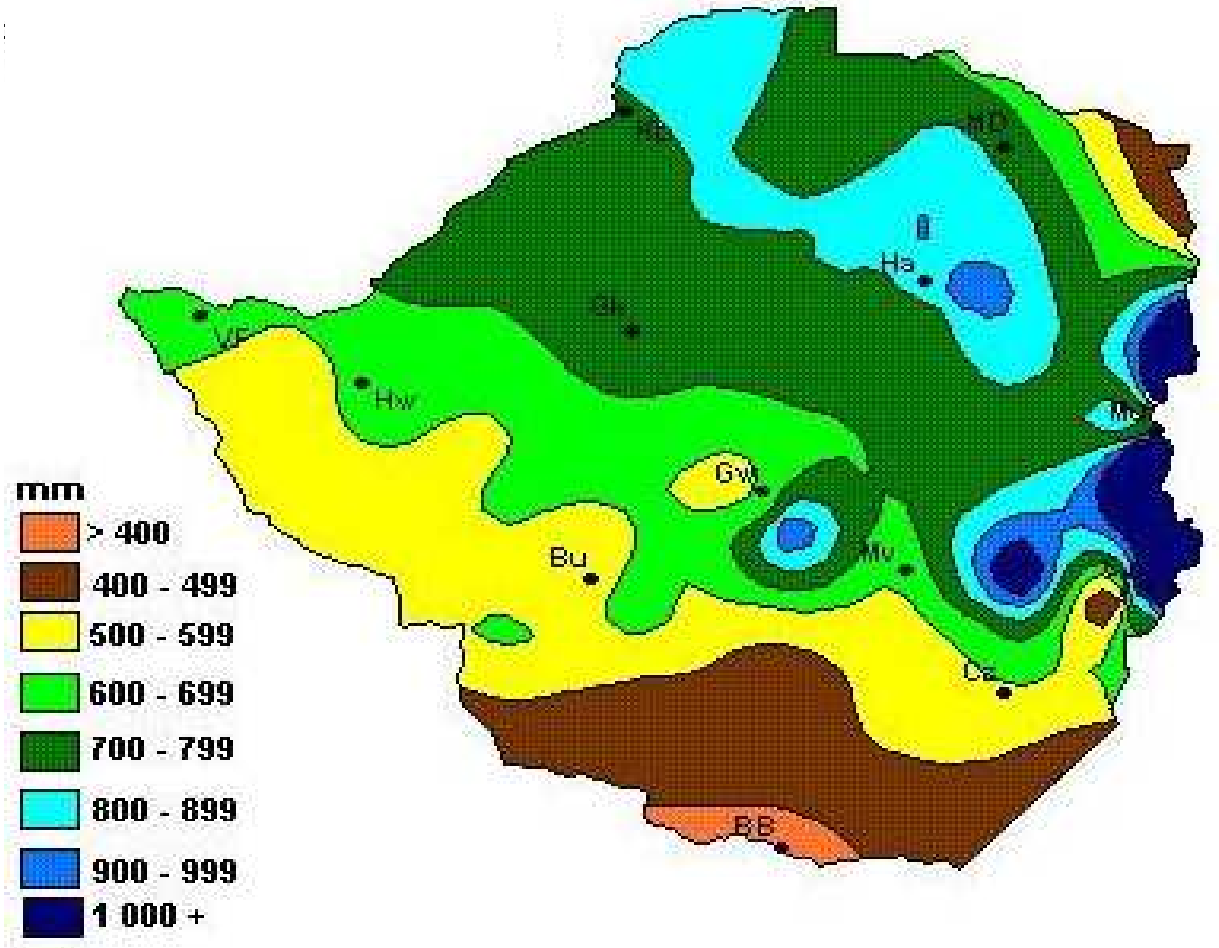
All dates for 2010/11 season onsets fell in November. The scale on the side of the map shows the days of the month from the 1st (bottom) to the 30th (top).



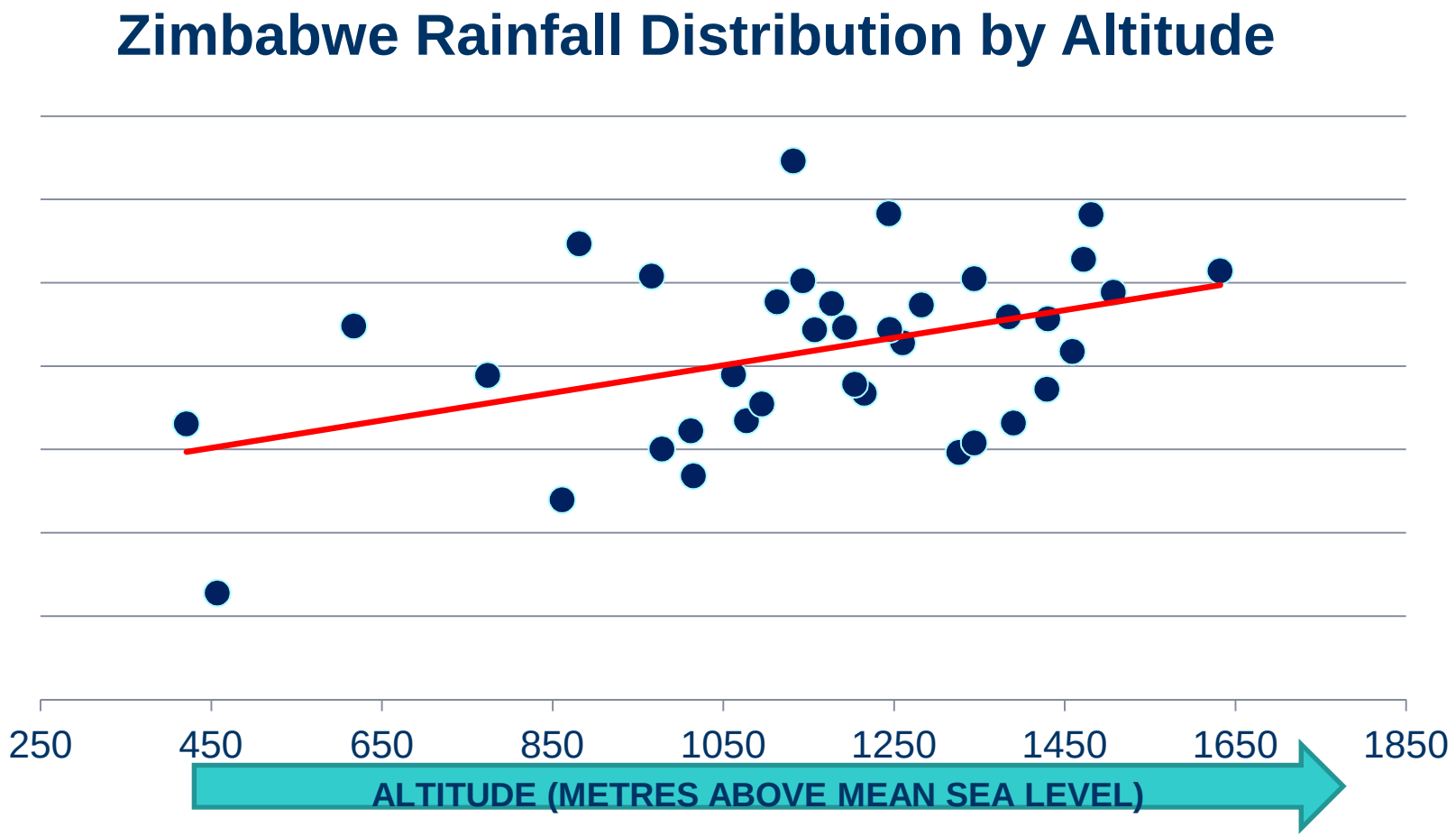
Rainfall Amts Vs Latitude



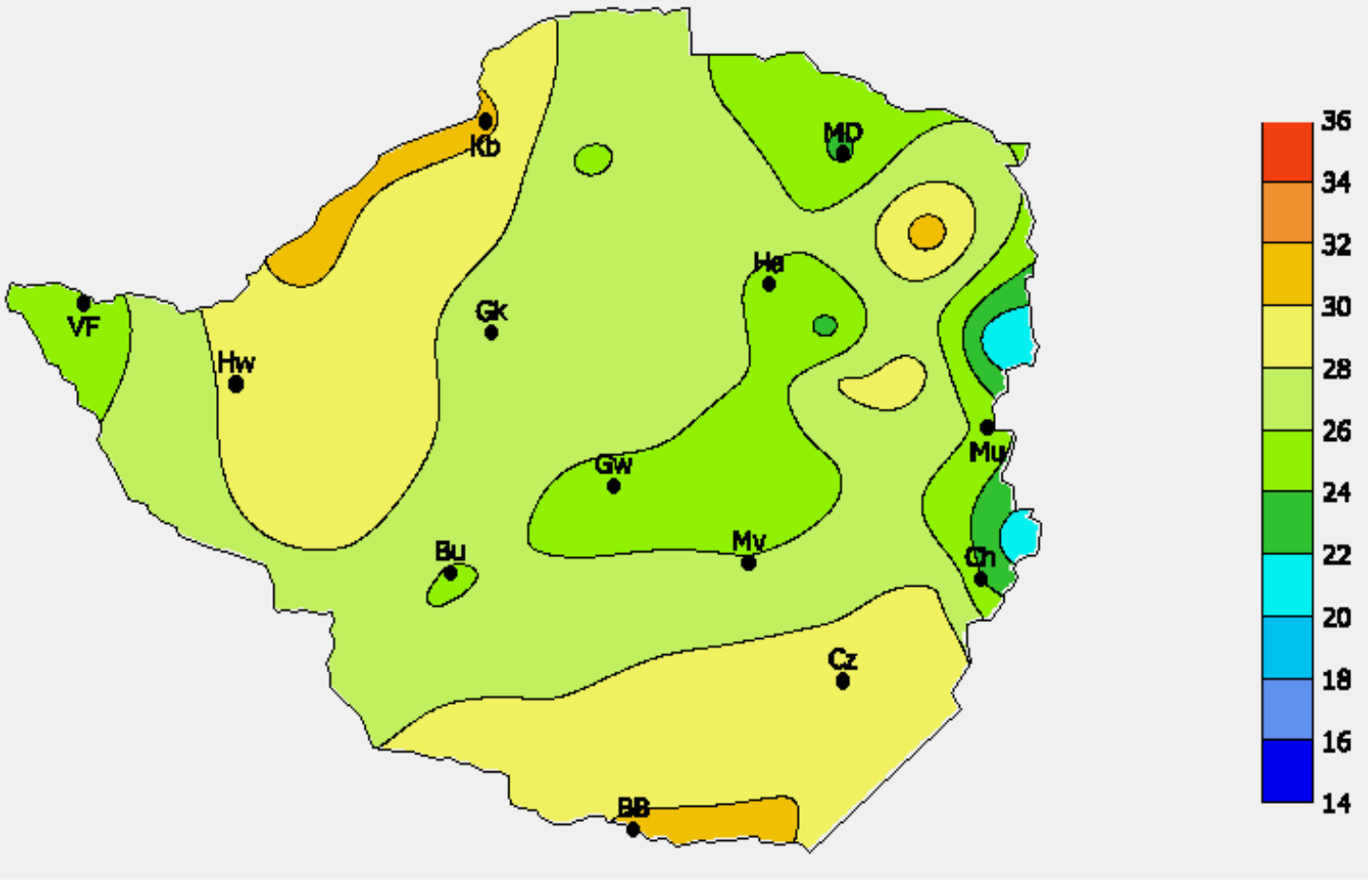
Zimbabwe Mean Annual Rainfall



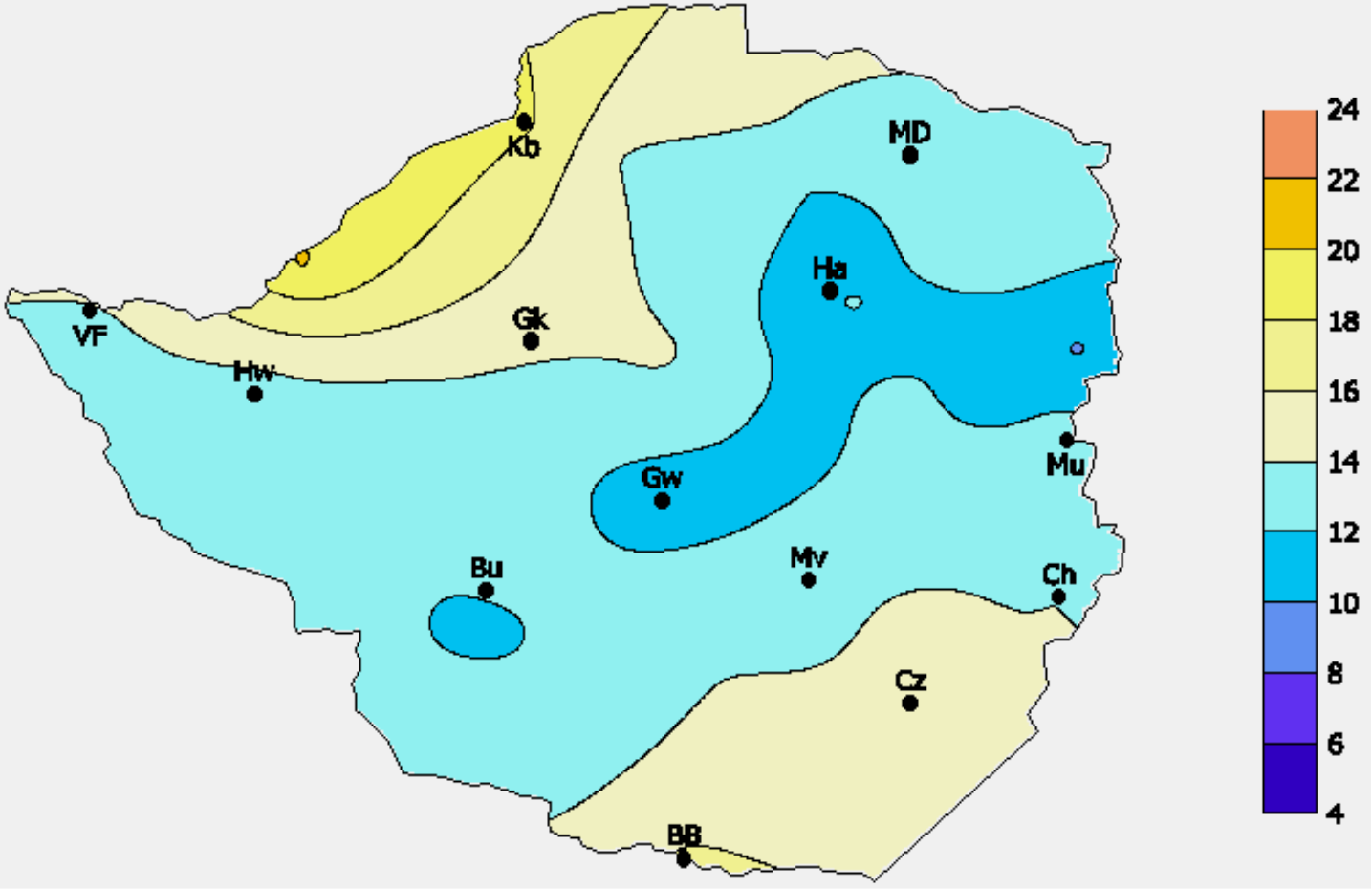
R/fall amts Vs Altitude



Zimbabwe’s hottest & warm areas (Av.Tx)



Zimbabwe’s coldest and warm areas (Av.Tm)



Weather related Hazards

- Tropical cyclones
- Floods and flash flooding
- Drought and intra season dry spells
- Thunderstorms and lightning
- Hail storms
- Heavy rains
- Ground frost
- Heat Waves

Prediction of met hazards

- Biggest challenge is the prognosis lead time.
- Thunderstorms, lighting and hailstorms – hours to 1 day.
- Ground frost – 3 days to 1 week.
- Tropical cyclones – 1 week
- Heavy rains and floods – 3 days to 2 weeks.
- Dry spells – 2 weeks.
- Meteorological Drought – 3 months

Heavy rainfall

- A rainfall measurement of more than 100mm in 24 hours is regarded as a severe weather event.
- Usually associated with mesoscale severe convection or the passage of a tropical cyclone.
- Fortunately, Madagascar acts as a deviator of more than 95% of tropical cyclones from the South West Indian Ocean.

Lightning and hailstorms

- A result of very high convective available potential energy – high temperatures.
- Usually occur during the first half of the season or after some days clear skies and very high temperatures.
- Highland areas are prone to lightning – those that lie along the main watershed.

Hailstorm damage in 2009/10

- Two people were killed in Dotito
- 51 homesteads destroyed in Muzarabani
- Three schools destroyed in Mhondoro
- Hundreds of hectors of tobacco destroyed in Magunje.

HAILSTORM: One of schools destroyed in Mhondoro

Hailstorm damage in 2009/10 - economic impacts

- Hundreds of hectors of tobacco destroyed in Magunje.
- PLEASE INSURE YOUR CROP!

TOUGH CHOICE . . . Mr Petros Ndambakuwa and his wife Rhoda of Kapare Village destroy tobacco plants after a hail storm wreaked havoc in Magunje last week. Scores of farmers have lost tobacco worth thousands of dollars to hailstorms prompting calls from various stakeholders for crop insurance.

Hailstorm

- Homestead destroyed in Muzarabani

TATAL BLOW . . . Mrs Rosemary Ugali who was injured in the hailstorm searches for valuables from the debris of her house.

The Herald – Feature Story 28/01/2010
WHEN NATURE DEALS A HAND (a)

Monday 25 January 2010, Harare, Zimbabwe

Feature The Herald

WRITE OFF . . . The Mutumba family of Zvitokwe village, Shamva, watch as their cattle graze their wilting maize crop last week. Such scenes are now commonplace in various parts of the country.

DICING WITH DEATH . . .

A WOMAN carries a colleague on her back as they cross the Marimba River between Mafakose and Cranborough North during the Christmas holidays, risking being swept away by flash floods. Police have warned the public against crossing flooded rivers.

THE HERALD 27/12/2009

Kariba floodgates to be opened

Chinhoyi Bureau

THE Zambezi River Authority will soon open the Kariba Dam floodgates and authorities have started issuing warnings to villagers in low lying areas of the Zambezi River on the impending floods.

The Herald 28/01/10

PUPILS at Nyangwene Primary School in Mhondoro clear roofing debris after a hailstorm destroyed their school last week.

Hailstorm destroys schools

Herald Reporter

OVER 700 pupils at two schools in Mhondoro are learning in the open after a hailstorm

"This is a double blow to me because my property was also damaged. Thank God my children and I escaped unhurt."

ST CHURCH
ABWE
High School

The Herald 30/01/10 HARARE, ZIMBABWE

MOTORISTS negotiate their way through a section of Borrowdale Road flooded by the recent rains. Poor drainage, largely caused by blocked storm water drains, has rendered many roads dangerous for drivers who risk damaging their cars in potholes submerged under rainwater.

Heavy rains to continue: Met Dept

Agriculture Reporter

HEAVY rains pounding most parts of the

Mr Zinyemba said high rainfall was usually recorded along the watershed.

riod between January 1 to s year, heavy thunderstorms in Victoria Falls and Nyanga. ficant falls in the past week

"Kadoma, Bulawayo and Hwange have the highest percentages of normal rainfall," said Mr Zinyemba.

A number of farmers have been wishing for rains since their crops had started wilting due to the dry spell that was being experienced in

Cabinet to meet over dry spell

Rainfall normal: Met

MOST parts of the country have so far received normal to above normal rains since the wet season began, the Meteorological Services Department has said.

The department said, to date, most of the country had experienced rainfalls of 75 percent and above of their seasonal averages. Met Services head of forecasting Mr Tich

MONDAY 4 JANUARY 2010 The Herald, Harare, ZIMBABWE

Brace for heavy rains, says Met Offi

By Tendai Mugabe

FARMERS should brace for heavy rains starting tomorrow and expected to cover most parts of the country following a fortnight's dry spell that resulted in many crops

tomorrow.

"Starting from Tuesday (tomorrow) there will be an all area activity where we are expecting afternoon and

Saturday, adding that farmers should not panic because more rains were expected this month.

"We have so far received rains above normal since the

have such clouds.

"In Lupane, the operation is already bearing positive results and last Saturday the area received 23 millime-

spell continues for a week, we another disaster. The rains have since the beginning of the farmi

Vacate homes to avoid floods: Met Offic

By Kuda Bwititi

ZIMBABWEANS living in low-lying areas have been urged to relocate to higher ground as the heavy rains being experienced in most parts of the country and predicted to persist for several more days are expected to result in serious localised flooding.

The Civil Protection Unit (CPU) and Meteorological Services Department have warned that the rains, which started falling across the country on Thursday, will continue into the week. Low-lying areas in Mashonaland Central, Matabeleland and Midlands are likely to be hit hardest by the forecast floods, which pose serious risks to human life,

such as Middle Sabi, Muzarabani, Chikwalakwala, Tsholotsho and Gokwe to consider relocating to safer ground to avoid the floods.

"The department advises people in low-lying areas such as Middle Sabi, Muzarabani, Chikwalakwala, Tsholotsho and parts of Gokwe as well as those living close to dams, lakes and rivers to monitor water levels and move to safe ground timeously."

It also warned members of the public, especially children and public transport operators, to avoid crossing flooded rivers as this could cause drowning.

The Met Department said the heavy rains that

cloud system responsible for the rains would continue to hover over most parts of the country.

"The Meteorological Services Department wishes to advise that copious rain has occurred across the country with heavy falls in places. Meantime, the cloud system responsible for the wet weather should remain anchored over Zimbabwe, thereby further increasing the prospects of more rain across the country up to November 24 or beyond," said the Met Department's acting director, Mr Tirivanhu Muhwati

Mr Muhwati said heavy rains, which initially started in the provinces of Matabeleland, Bulawayo experienced in all parts of creasing the risks of flash

floods.

"Because of risk of localise said the depart

A violent stor winds of up to 4 was also recor Matabeleland r nent in Zimbab

Mr Muhwati founded becau of the middle sure forces in t

According t Friday, the t

Dry spell forces tobacco growers to reap early

Agriculture Reporter

THE dry spell being experienced in many parts of the country has forced some tobacco farmers to reap their crop before it fully matures, accepting the largely poor yields rather than writing off the crop.

Induced maturity in dry land tobacco has become widespread in Manicaland and Mashonaland East

Mashonaland Central provincial Agritex officer Mr Stancilae Tapererwa said, "Some farmers have started topping, while others are applying top dressing.

"Most farmers have the fertilizers since they are producing under contract, but the commodity is scarce on the open market."

Tobacco flowering usually results in small leaf produc-

which led the passers-

Dry spell set to end: Met

Herald Reporters

FARMERS are likely to get the relief they were praying for after the Meteorological Services Department yesterday said the country would possibly receive significant rains

northern Midlands have already started receiving light to moderate rainfall.

Weather forecaster Mr Jephias Mugumbate said some stations had recorded high amounts of rainfall over the past week

the greater part of the Midlands and the

Hailstorm leaves 54 Muzarabani families

Bindura Bureau

that hit parts of Muzarabani at dered about 54 families homerate need of shelter and food.

Darwin, earlier this month.

In the latest case, 54 homesteads were destroyed while about four hectares of mature tobacco was damaged.

— visited the affected villages to assess the damage caused by the hailstorm.

Addressing the affected families, Adv Dinha

pened in Dotito," he said.

Adv Dinha assured the community that by the time the schools open

after the walls collapsed.

"Some of the parents of the ch

Heavy rains expected

Herald Reporters

HEAVY rains are expected to pound most parts of the country starting tomorrow, ending a prolonged dry spell that has seen many farmers anticipating heavy losses.

Meteorological Services Department sen-

local milling companies to import genetically modified grain and will insist that all importers buy produce grown under natural conditions. Agriculture Minister Joseph Made yesterday said Zimbabwe was not yet ready to handle genetically modified grain.

"Government will not allow the industry

Better season for Sadc forecast

LATEST rainfall forecast points to improved season for most of Sadc.

The January to March 2010 climatic projections just released show more rainfall for most parts of Southern Africa than in the first half of the season, October to December 2009.

The predictions are still largely consistent with the forecast of the 13th Southern African Regional Climate Outlook Forum held in August 2009.

era Botswana, northern Lesotho, southern Mozambique, northern South Africa, Swaziland and southern Zimbabwe.

Areas with a high likelihood of below-normal to normal rainfall include southwest Angola, western Namibia and south-western South Africa.

From a farming perspective, the long dry spells usually come when rainfall is most required by crops, particularly cereals and thus negatively

the climate of the Sadc region including the Indian Downpour and atmospheric circulation processes that bring moisture into the region.

In view of these factors, the wetter than normal conditions in some parts of the region and the drier than normal in the other parts are linked to the effects of the El Niño phenomenon.

The impact of El Niño in the Sadc region has var-

global warming.

Records provide evidence that during the la four decades the number of El Niño even increased while the number of La Niña event decreased.

The former phenomenon is known to occu approximately every four to seven years, but th last four El Niños including the current one, hav

Experts predict normal to above normal rains

The Herald

Masvingo and Midlands pro received rains in the past t crops have been wilting.

In many areas, crops have

The Met Department, whi seeding last year, predicted normal rainfall for the first season and normal to below in the second part, which January to March. The co experiencing successive d the past few years, adve agricultural production.

Meanwhile, Governmen

Crop condition remains dire despite rains

Herald Reporters

ondition remains dire in most parts of the coun-

In Mashonaland East, little showers were received in some parts of Marondera while other areas received heavy

Hailstorm destroys schools

Herald Reporter

OVER 700 pupils at two schools in Mhondoro are learning in the open after a hailstorm blew off roofs of classroom blocks and destroyed stationery and furniture worth thousands of dollars last Saturday.

"This is a do property was a children and I

Villagers wh by the storm a

"We need

Farmer dies after hailstorm hoax

Agriculture Reporter

A KAROI farmer collapsed and died on Monday last week after receiving news that his 10-hectare tobacco crop had been extensively dam-

Said Mr Gasho: "Upon receiving the bad news, Masenda collapsed and was rushed to Karoi Hospital where he was admitted. The farmer died at around 3am on Monday."

that attended his burial is testimony of his good works," he said.

An officer at Karoi Police, who declined to be named, said yesterday that Masenda's death was not reported at the station.

Some parts of the country have been experiencing hailstorms that

- Weather and Climate
- Factors controlling Weather
- Zimbabwe Climate
- Weather related Hazards
- Climate Change facts- Zimbabwe.

What is Climate Change?

- **Climate change** is any long-term significant permanent change in the “average weather” of a given area/ region.
- Average weather may include average temperature, precipitation, wind and pressure patterns.
- It involves changes in the average state of the atmosphere over duration ranging from decades to millions of years.

IS THE CLIMATE OF ZIMBABWE CHANGING?

- YES

IS THERE ENOUGH EVIDENCE TO SUPPORT THAT?

- YES.

Why is it changing?

- Both Nature and Human activities cause the Change
- UNFCCC (1992) attributed the change to human activities which alter the composition of the global atmosphere.

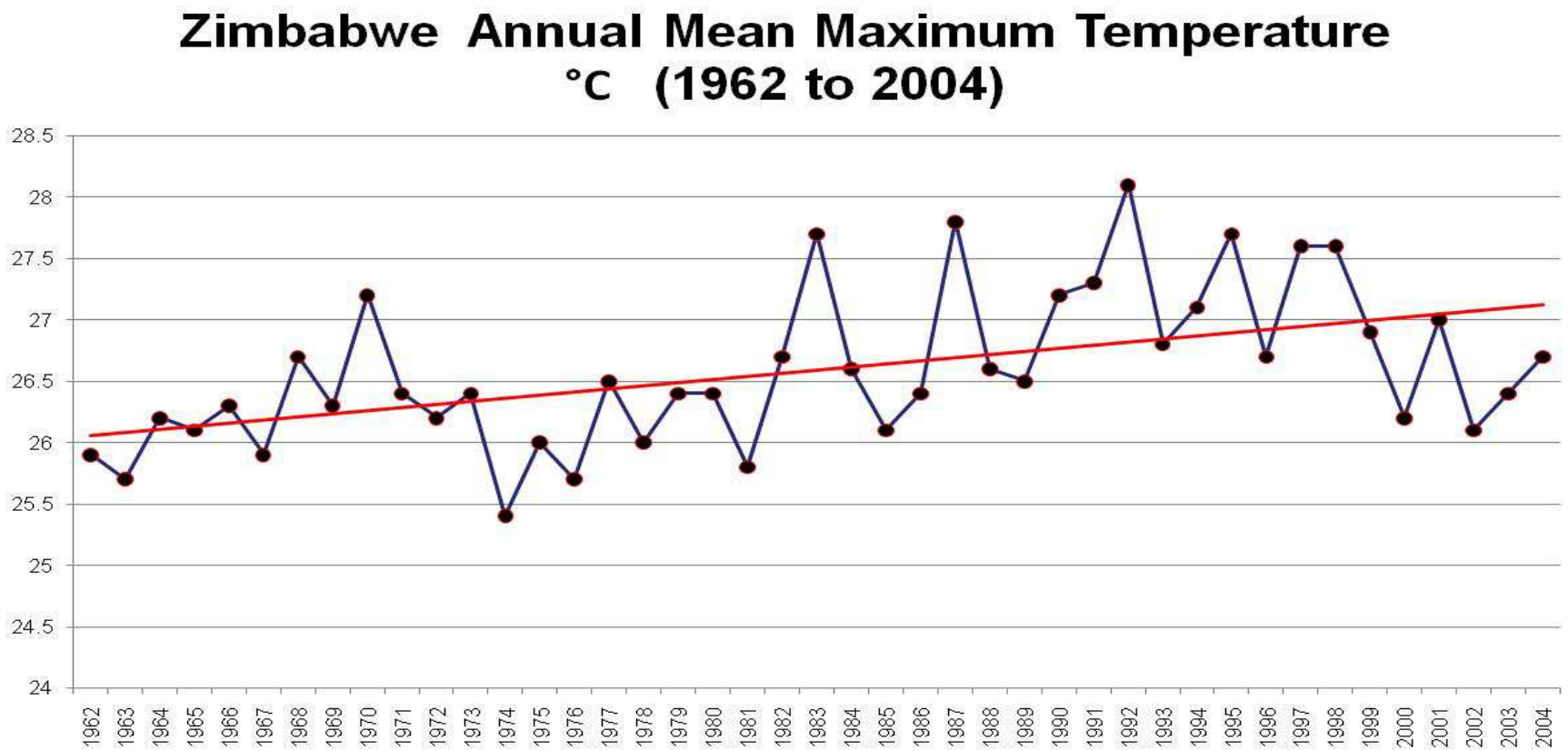
Main Human activities

- Industrial Revolution in Europe.
  - Rapid increase in greenhouse gas emissions
  - Increase in population growth
  - Increased deforestation and landuse
  - Increased atmospheric aerosols
  - Need to increase agricultural production

Climate change/variability? The difference

- Climate change refers to statistically significant variation in either the mean state of the climate or its variability persisting over extended periods (typically decades or longer)
- Climate variability refers to variations in the mean state and other statistics (standard deviation, occurrence of extremes) of the climate on all temporal and spatial scales.

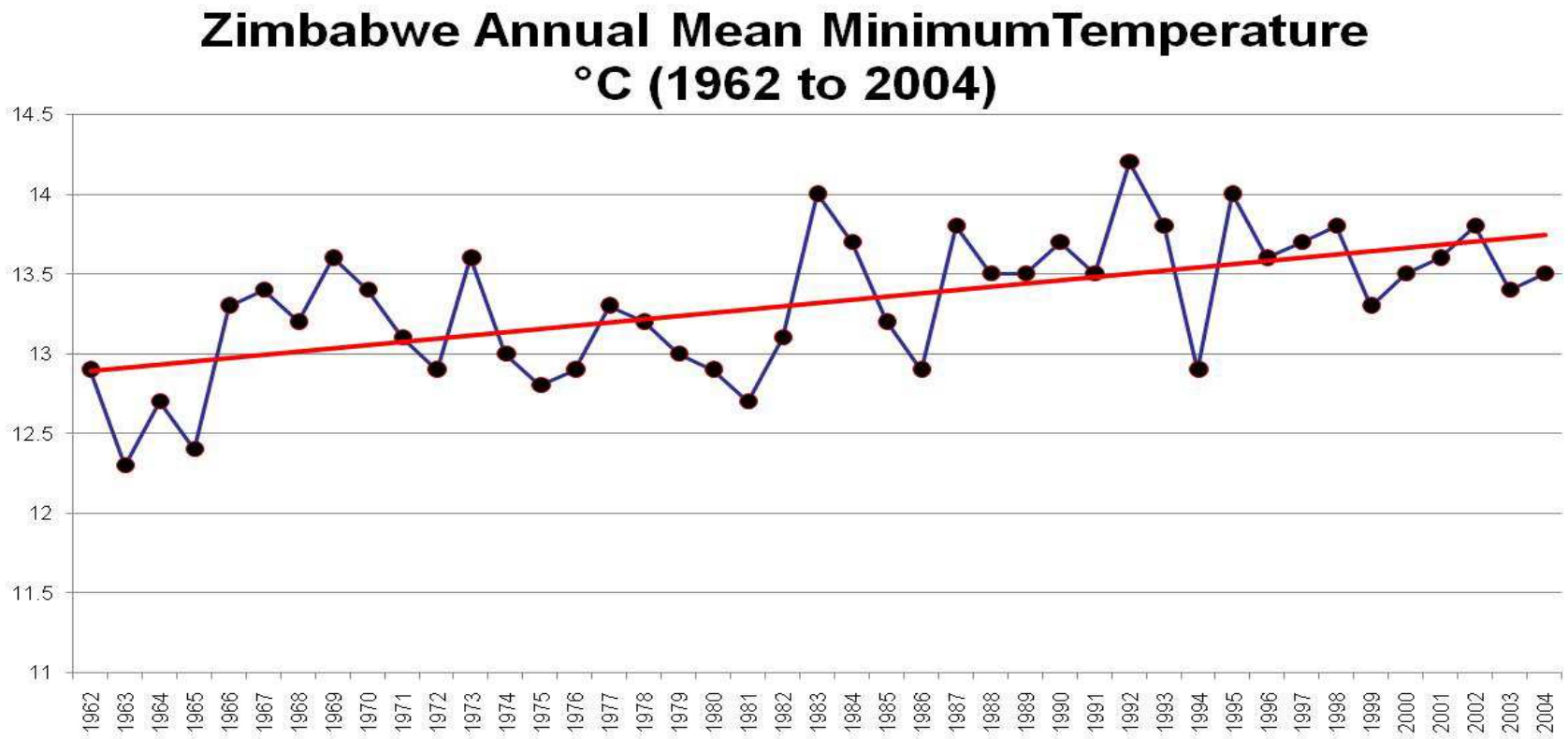
Annual Mean Maximum TºC (Daytime Temps)



Zimbabwe: temperature and rainfall extremes

- The temperature analysis shows a distinct trend towards higher temperature. Positive trends can be detected for the temperature time series in Zimbabwe from 1962 to 2004.
- Both annual min and max temps are showing an increasing trend.
- Annual average max and min air temperature has increased by around 2 degrees Celsius respectively during the past 100 years

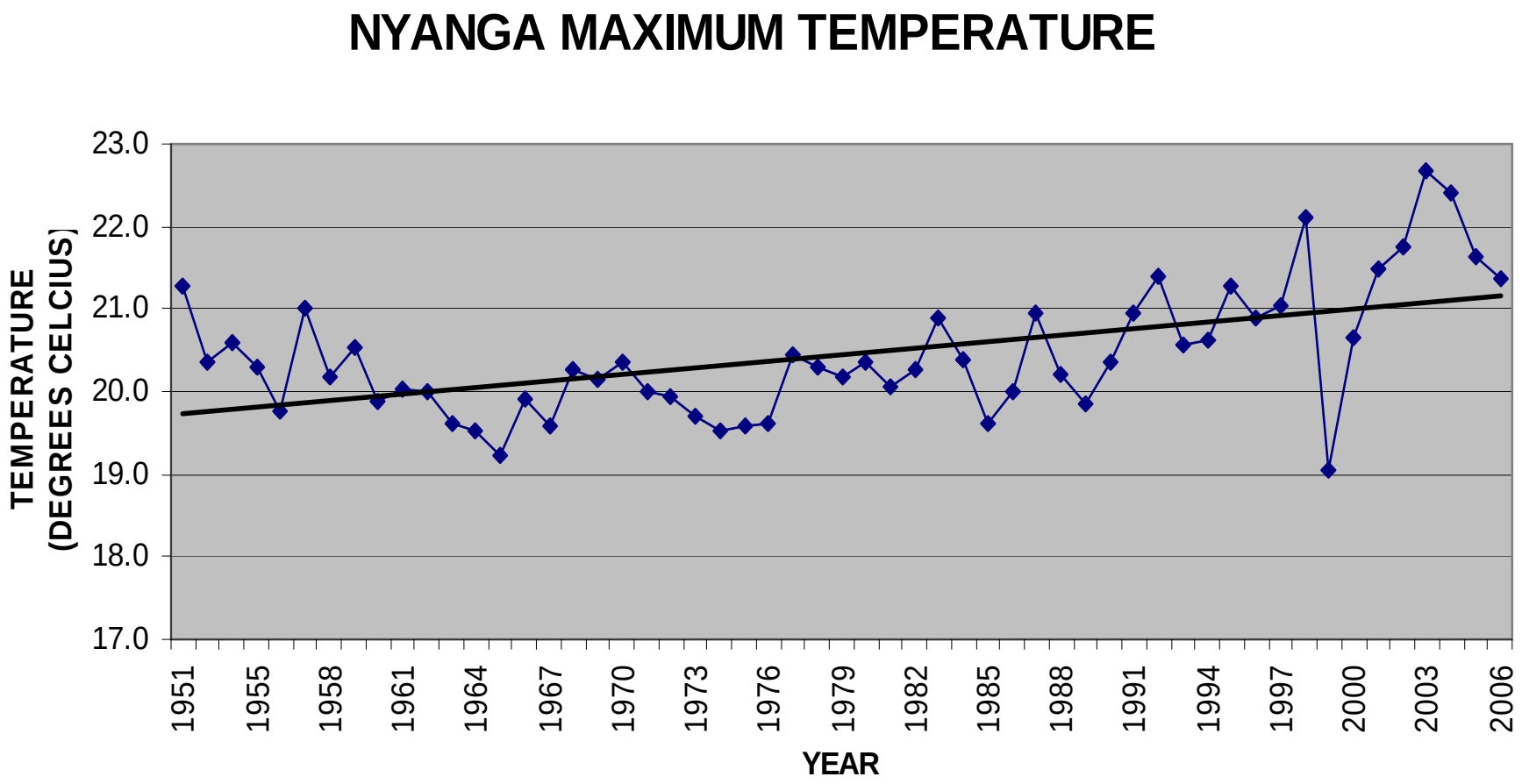
Annual Mean Night Temperatures



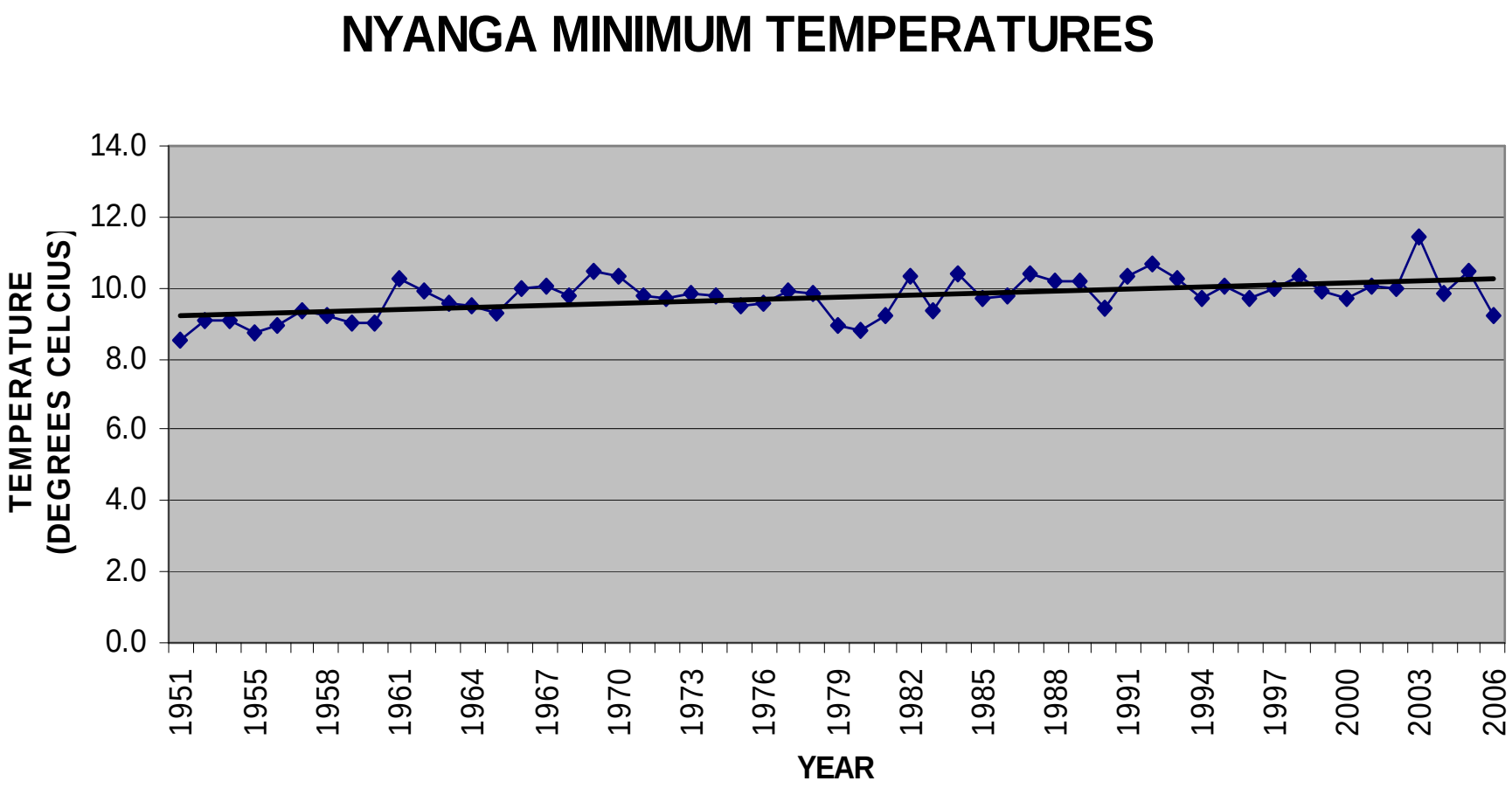
Temperature and rainfall extremes Cont…

- There is a trend towards decreasing number of cold days. There is also a noticeable increase in amplitude and duration of the mean annual deviation from the long-term average.
- Most of the temperature rise was observed over the last 40 years. Five warmest years on record for Zimbabwe have occurred since 1987 and that the increased frequency of droughts since 1990 (90/91, 91/92, 92/93, 93/94, 94/95, 97/98, 01/02, 02/03, 04/05, 06/07).

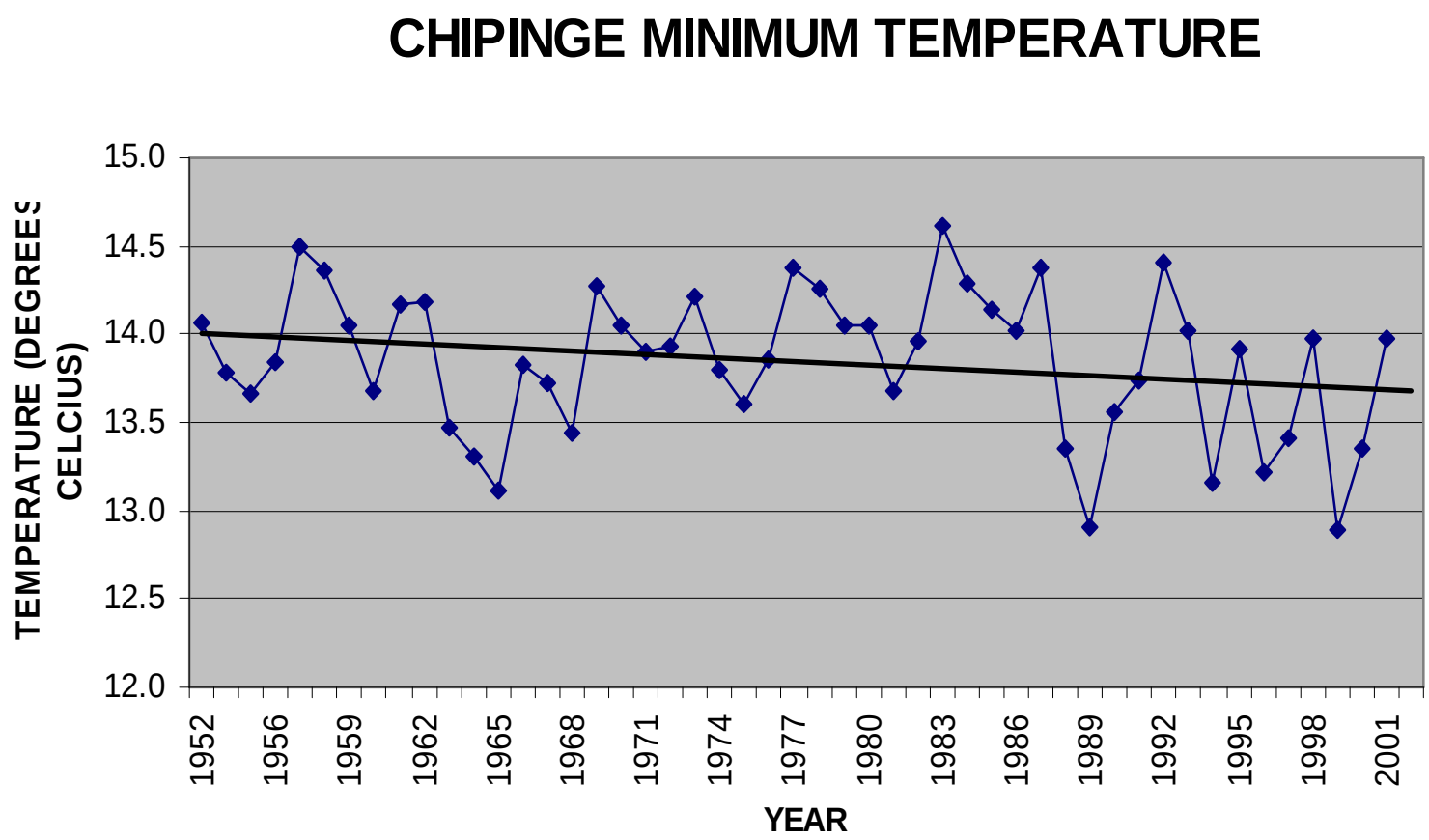
Nyanga's Av. Afternoon Temps



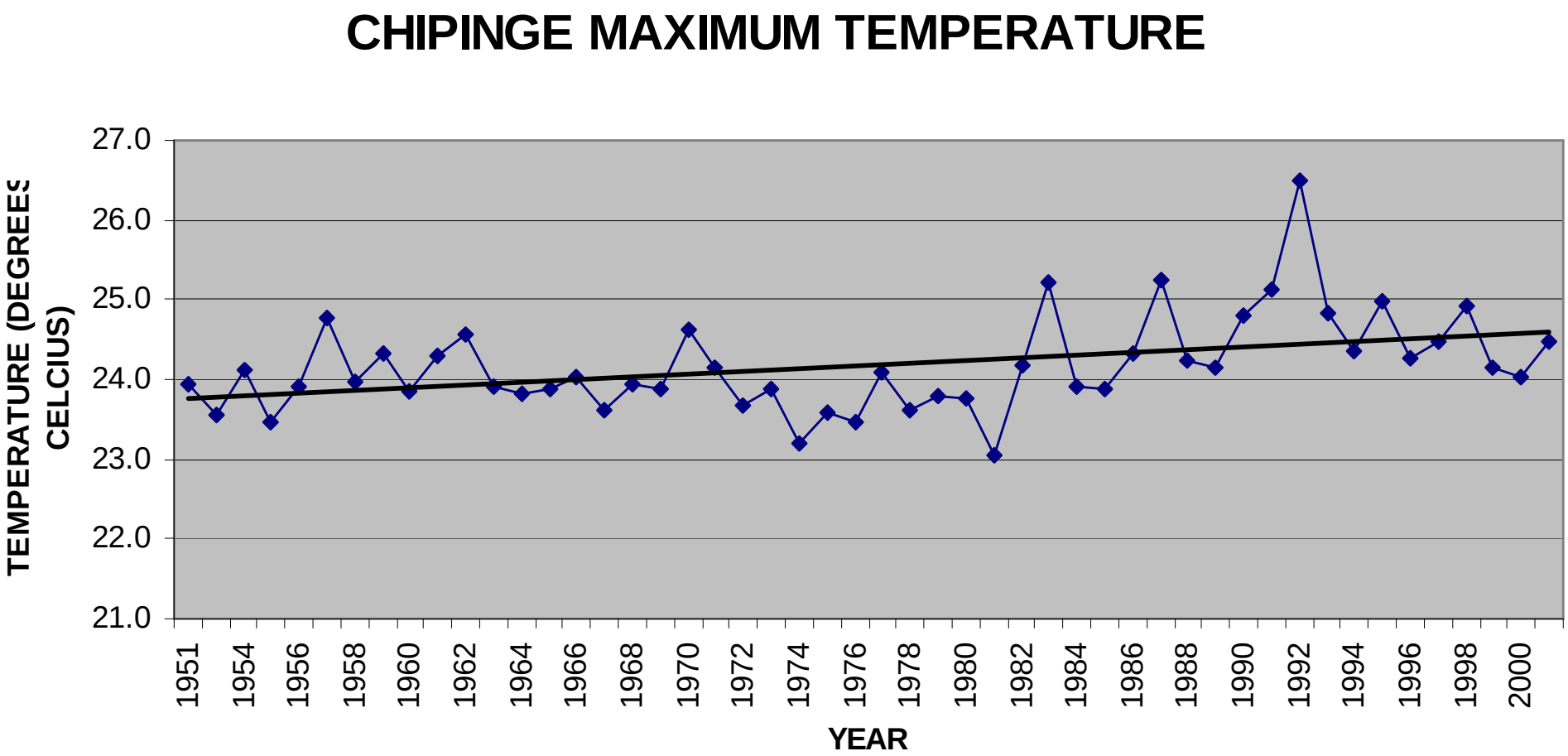
Nyanga's Average Night Temps



Chipinge's Night Temps



Chipinge's Daytime Temps

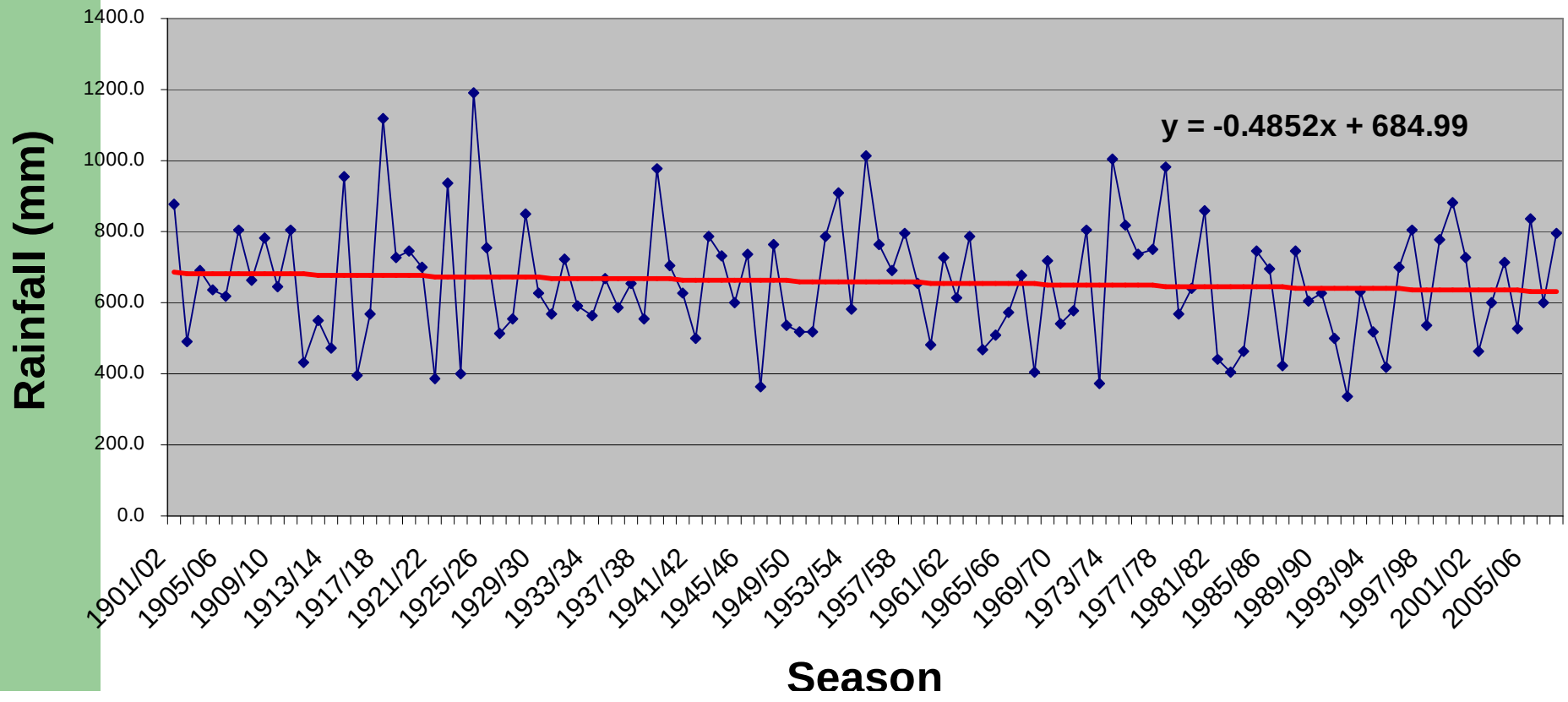


Zimbabwe: rainfall patterns

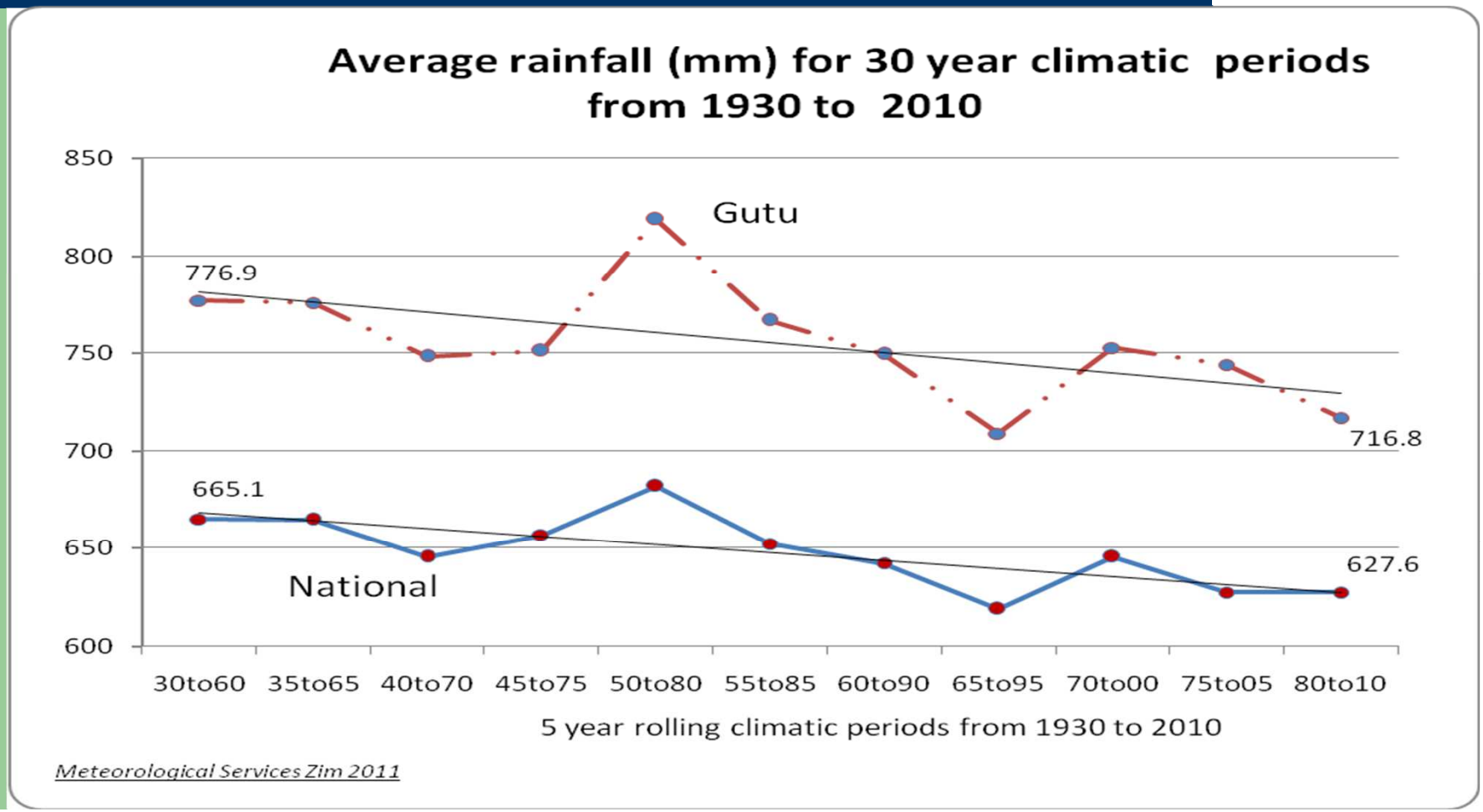
- Seasonal precipitation (1901 -2008) and monthly rainfall (1901-2008) trends in Zimbabwe have been analyzed.
- Negative precipitation trends are observed for the summer period.
- The month on month rainfall totals reveals an increasing in rainfall in the months of October and December.
- November, January, February and March reveal a decreasing trend. The observed trends reveal distinct patterns thus emphasizing the occurrence of floods and droughts in the country.

Zimbabwe: rainfall Analysis

Average seasonal rainfall (1901/2 to 2007/8)

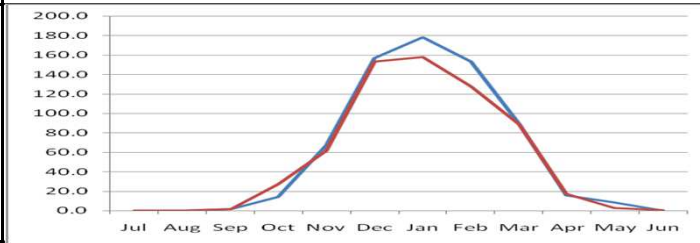
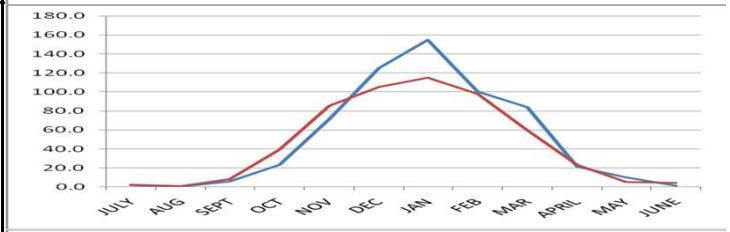
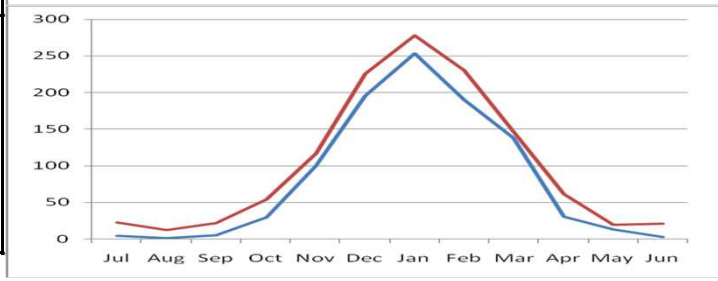


30 year climatic period Moving Av.

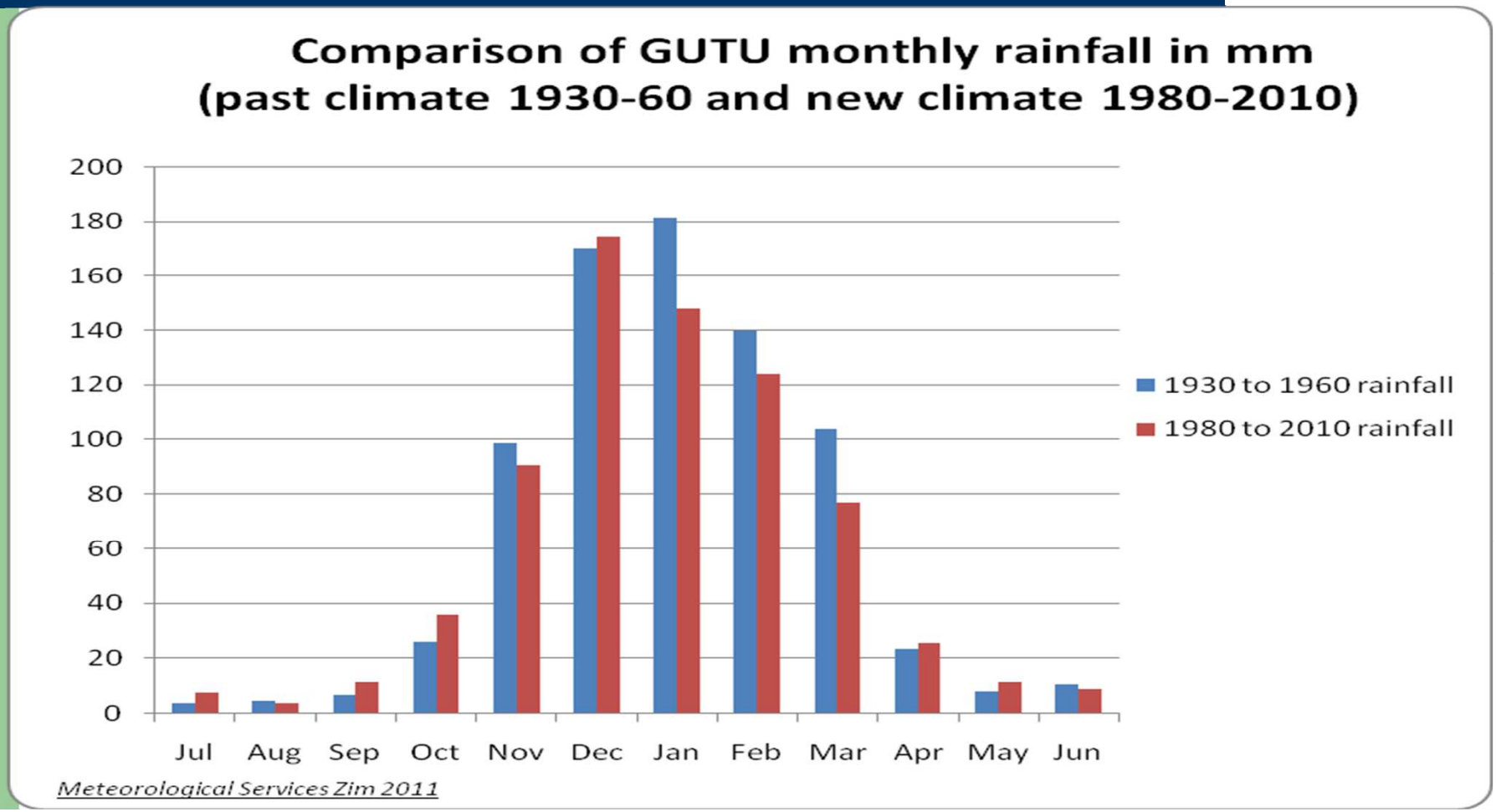


Meteorological Services Zim 2011

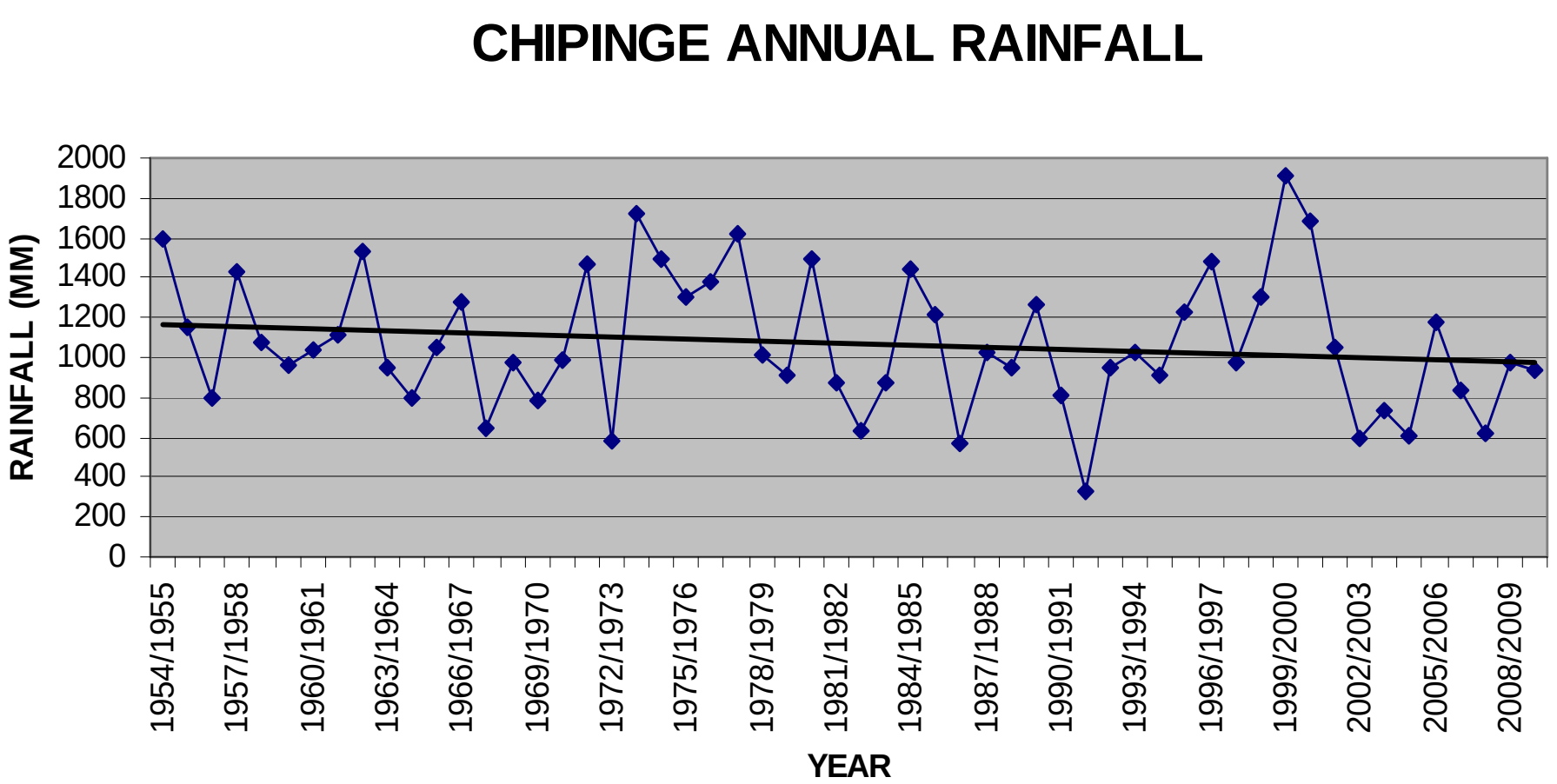
OLD CLIMATE vs NEW CLIMATE

Station	Rainfall in old climate (annual)	Rainfall in new climate (annual)	% change	Blue line represents old climate Red line represents new climate
Victoria Falls	684.7mm (1905/06-1934/35)	635.2mm (1975/76-2004/05)	-7.17%	
Matopos	598.4mm (1903/04-1932/33)	548.8mm (1975/76-2004/05)	-8.36%	
Nyanga	960.3mm (1905/06-1934/35)	1209mm (1977/78-2006/07)	25.94%	

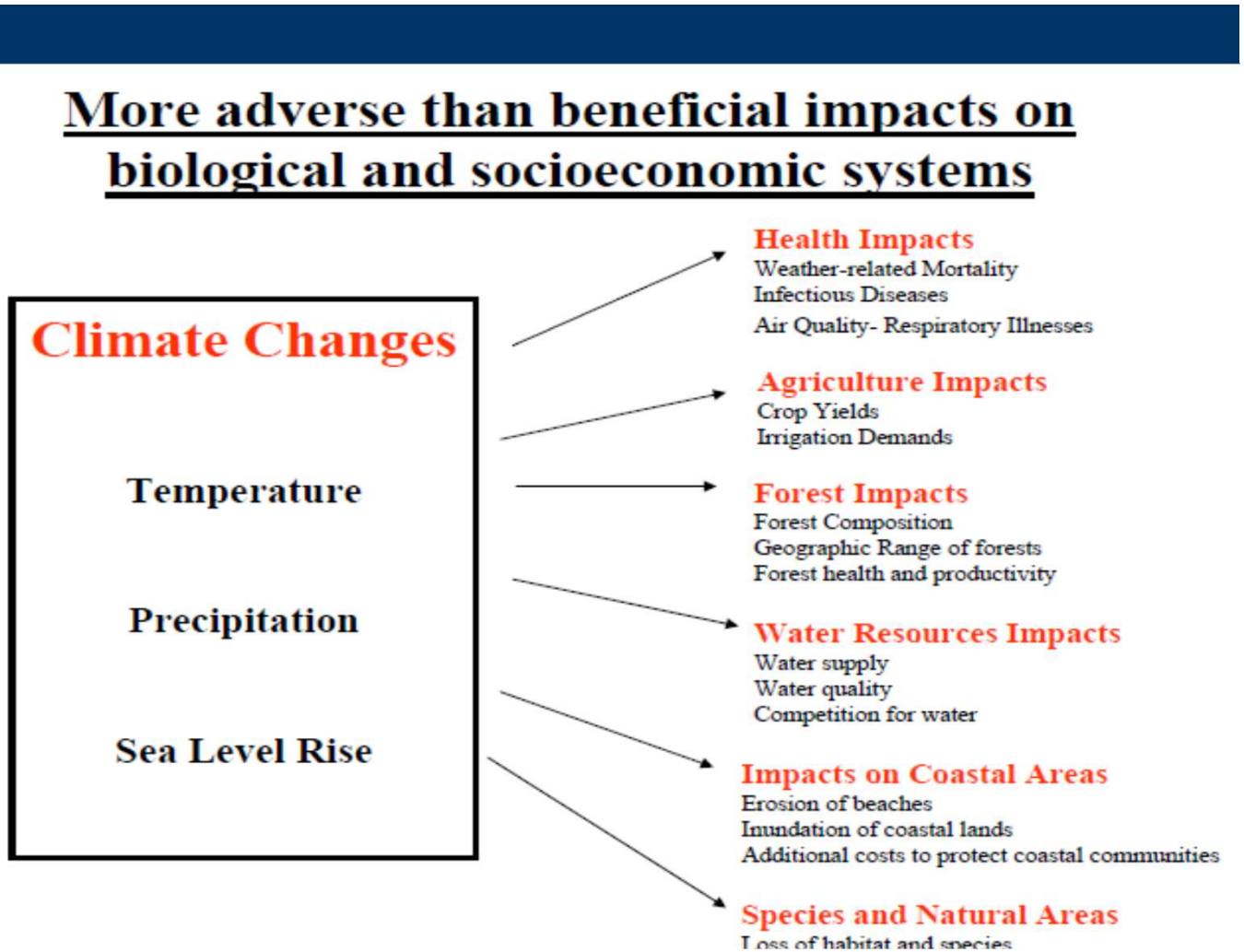
Past 30yr Climate period vs Recent 30yr Climate period



Chipinge Average Annual Seasonal Rainfall (1954/55-2008/9)



Economic Sectors affected by climate Change



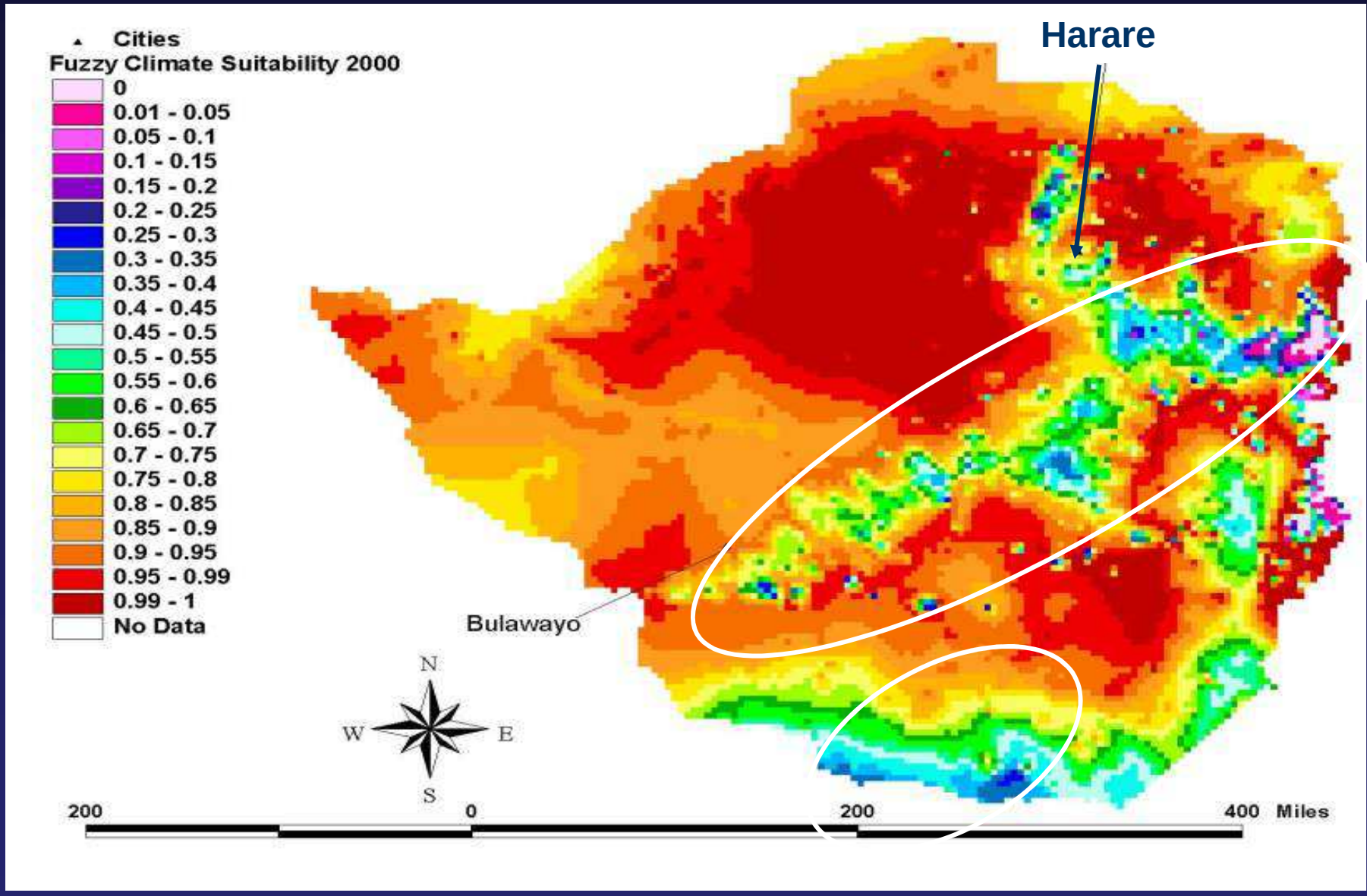
CLIMATE Vs HEALTH

- Climate and health are inextricably linked in a number of ways.
- Climate affects some of the most fundamental determinants of health: air, water, food, shelter and disease.
- It also plays a powerful role in the occurrence and spread of diseases worldwide, e.g. malaria, diarrhorea etc
- Mosquitoes that carry many of these diseases tend to thrive in warmer, wetter climates.
- Scientists are therefore concerned about an increased risk of water-borne diseases due to global warming that changes the survival rates of pathogens, coupled with increased rain and flooding, which mobilize contaminants.

Hazards for the future due to climate change and global warming

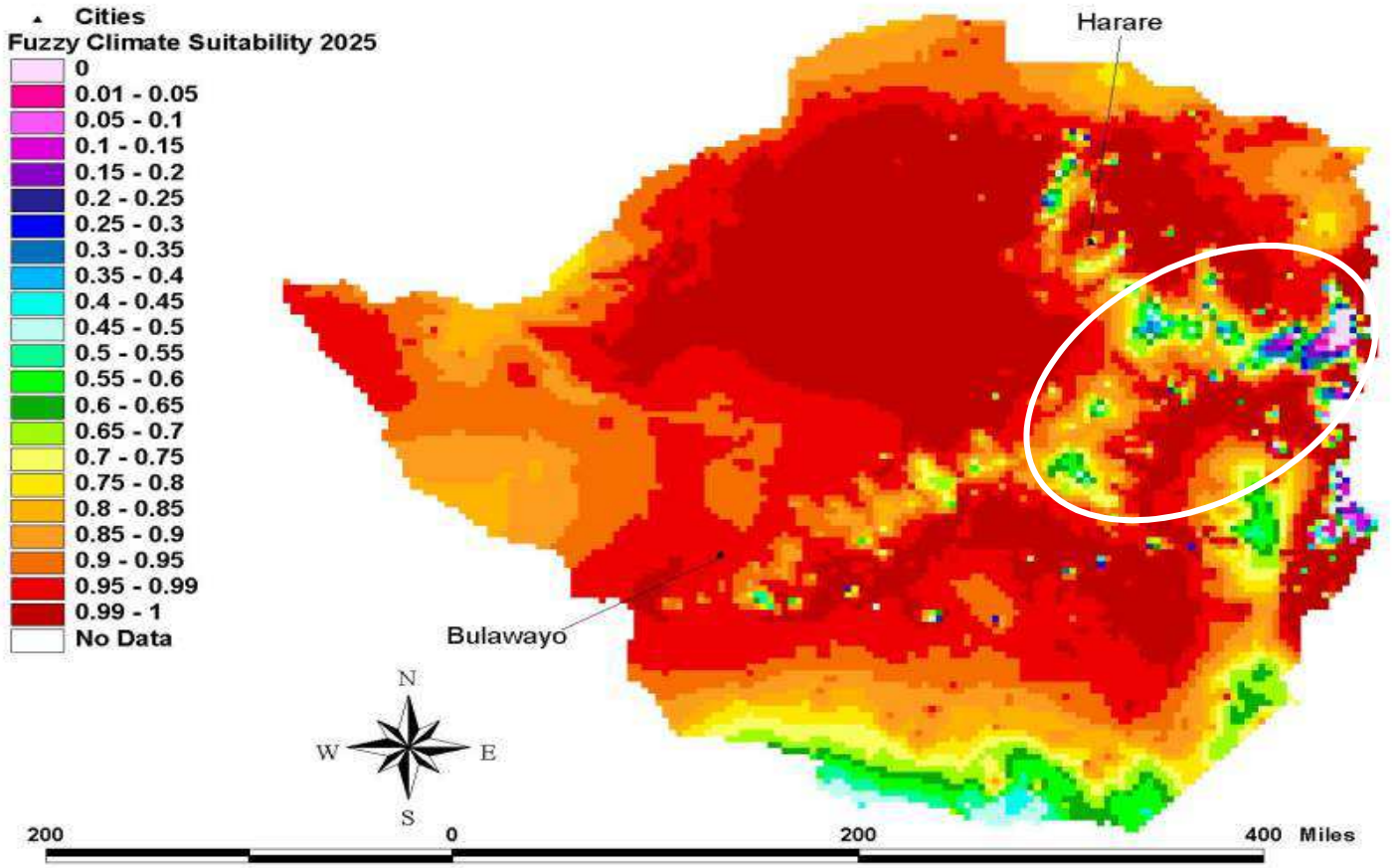
- EXAMPLE – MALARIA
  - Study done by Ebi et.al, 2005

Climate Change & Malaria (potential transmission) in Zimbabwe Baseline *2000* 2025 2050

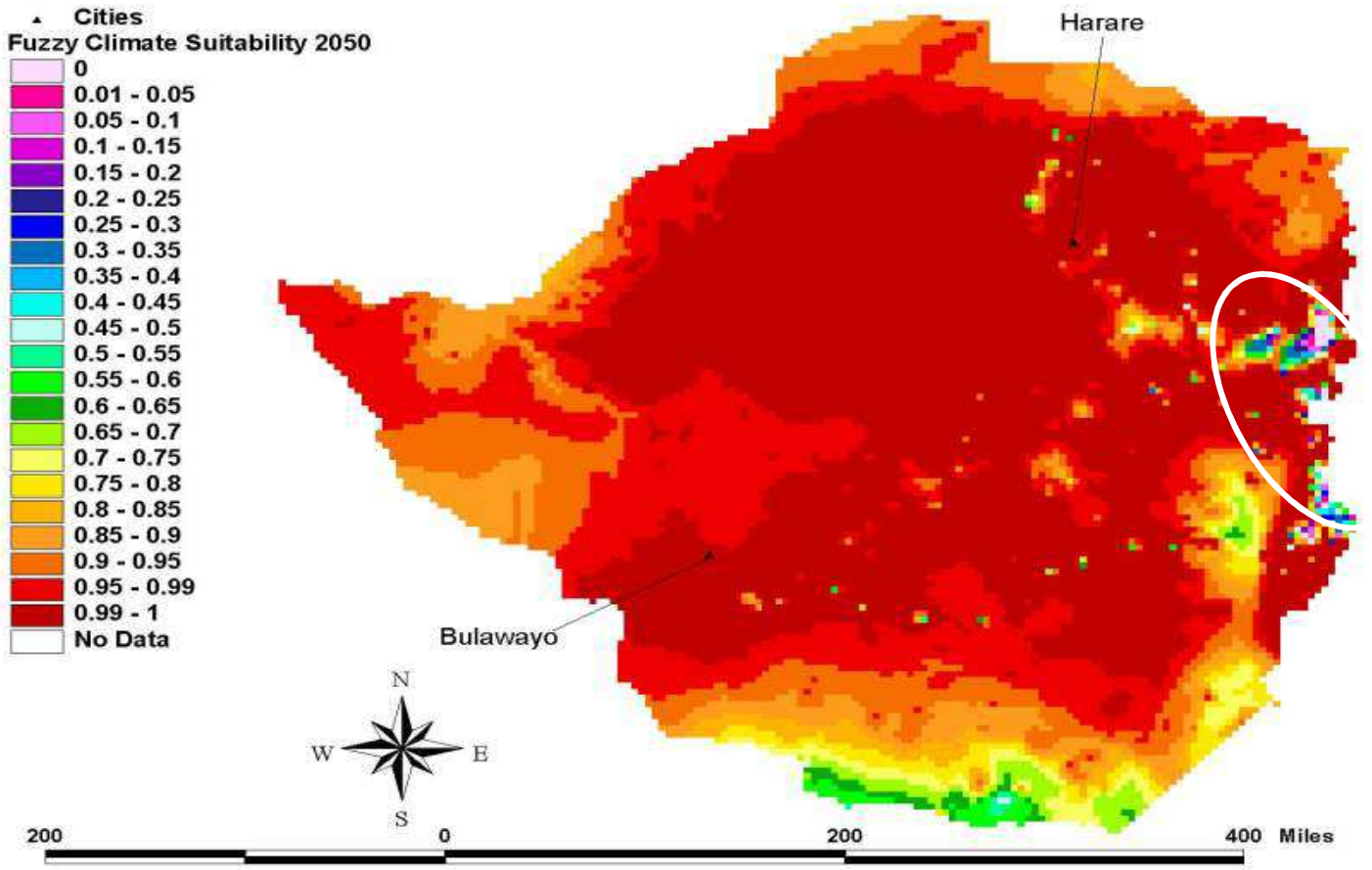


Ebi et al., 2005

2025 projections: Malaria potential transmission due to climate change



2050 projection



Thank you
Tatenda
Siyabonga