

CLIMATE
CHANGE
IN KENYA:
focus on children

Denying child rights
is wrong. Put it right.

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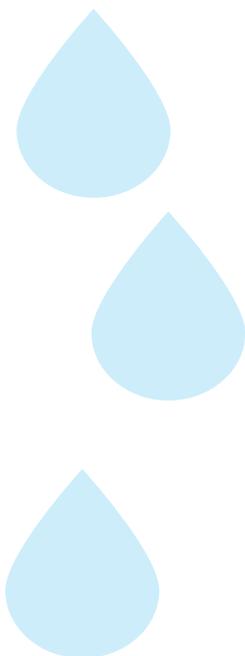
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INTRODUCTION

“Our home was destroyed by the floods and we have nothing left. My parents cannot even afford to pay my older siblings’ school fees since we have no cows left to sell.”

Nixon Bwire, age 13, Tana River



UNICEF UK and UNICEF Kenya have produced this case study to highlight the specific challenges for children related to climate change in Kenya; bringing climate models to life with stories from children in different regions. The study provides examples of how UNICEF can support children in Kenya to adapt to and reduce the impact of climate change.

Climate change is already having a significant effect on children’s well-being in Kenya. The impact on children is likely to increase significantly over time; the extent of the impact depends on how quickly and successfully global greenhouse gas emissions are reduced as well as the ability to adapt to climate change. Climate models show the range of likely future impacts.

The projections in this paper use the United Nations Development Programme (UNDP) and the University of Oxford School of Geography and Environment interpretation of scenario A2 from the Special Report on Emissions Scenarios (SRES). They used an ensemble of 15 models to arrive at the figures used here.

Scenario A2 posits regionally oriented economic development and has slower and more fragmented economic and technological development than other scenarios. It assumes the global population reaches over 10 billion by 2050, and that greenhouse gases will increase.

The UNDP notes that users of the information should bear in mind that the model data for the future are not predictions of climate, but model simulations of future climate under a range of hypothetical emissions scenarios and should be interpreted with caution.

However, one change is certain: there will be less predictable weather patterns over the coming



“Climate change is affecting us and, in the future if we are not involved, we will live in a desert. The rivers have dried up and sand mining has increased, this has caused many children to drop out of school to work loading vehicles for mines”

Samuel, age 14, Machakos

decades in Kenya. Children and communities will need support, skills and infrastructure to ensure they can survive and thrive in the face of this uncertainty.

This case study provides examples of the type of support that may be needed to prevent or reduce future impacts of climate change. By involving children in climate adaptation and disaster risk reduction programmes, there is potential for improved outcomes. Equipping the next generations with the skills and knowledge to thrive in a changing climate is becoming increasingly important.

This case study describes programmes that can help communities in Kenya adapt to specific challenges posed by climate change. These examples are based on successful UNICEF programmes in other countries facing similar climatic challenges to Kenya.

Better understanding of the differing risks posed by climate change within Kenya is vital in order to ensure development within these environmental changes. Tools that enable climate change data to be easily accessible and regularly updated will be an essential part of every country’s ability to reduce risk and future impacts. Funding for disaster risk reduction and climate resilience programmes is vital to protect children’s rights to survive and thrive – rights such as clean water, food and the chance to go to school.

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KENYA: CLIMATE CHANGE

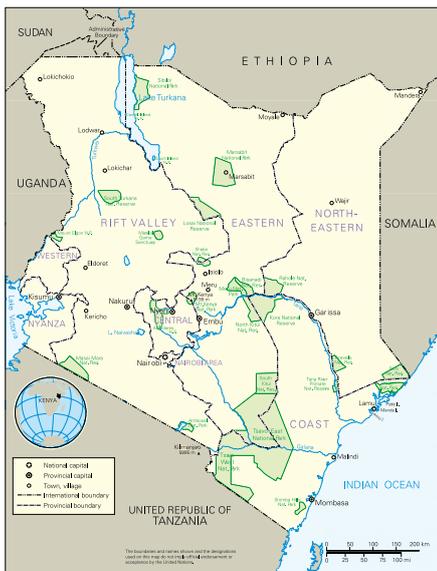


FIGURE 1: Country map of Kenya, showing major cities and regions.

CLIMATE PROFILE

Kenya's landscape rises from the Indian Ocean in the east to the edge of the East African Plateau and the Great Rift Valley in the west. The country straddles the equator. Temperatures in Kenya's tropical climate vary considerably according to topography; the central highlands are substantially cooler than the coast, with the coolest (highest altitude) regions at 15°C compared with 29°C at the coast.

Kenya lies within the Inter-Tropical Convergence Zone (ITCZ), a narrow belt of very high rainfall that forms near the equator. The ITCZ brings rain southwards through Kenya from October to December (the 'short rains'), passing again northwards in March, April and May (the 'long rains').

The timing of these two rainy seasons, how long they last and their intensity varies from year to year. As is the case for the climate across the rest of sub-Saharan Africa, the surface temperature of the water in the Indian Ocean greatly influences the rainfall pattern in Kenya. This surface temperature varies from year to year. The most important influence is the El Niño Southern Oscillation (ENSO). El Niño episodes usually cause greater than average short rains, while cold phases (La Niña) bring a drier than average season.

CLIMATE CHANGE NOW

Climate models can only predict a range of possible future scenarios. However, we know that Kenya's climate is already changing. Average annual temperatures increased by 1°C between 1960 and 2003, with most warming taking place in the 'long rains' season of March, April and May, which is also the primary planting season.

The days are getting hotter in Kenya, with 'hot days' up by 57 every year, equal to a rise of 15 per cent between 1960 and 2003. There are relatively more 'hot days' during the 'long rains' season – an additional 18.8 per cent. The average number of hot nights per year has increased even more, by 113.

Kenya has experienced both prolonged droughts and intense flooding every year since 2000. As well as an increase in such extreme weather events, the glaciers around Mount Kenya have disappeared, leading to the drying up of river streams. Such changes have already led to harvest losses and food shortages, as well as landslides, soil degradation and a loss of biodiversity. Pests for humans, plants and animals are also increasing. Fewer cold days and nights is contributing to the spread of malaria to new areas. The diminishing water sources and erratic rainfalls have also reduced the availability of water. These trends have negative impacts on child survival and development through increasing childhood exposure to disease and reducing access to safe water for children and their families.



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FUTURE SCENARIOS FOR KENYA

Under current projections, the UNDP estimates that Kenya's average annual temperature will rise by between 1°C (the lowest estimate) and 5°C (highest estimate) during the next century.

Up to 2100, the period of the rains will remain the same (both the short and long seasons), but each rainy season will become wetter, particularly the 'short rains' (from October to December). Global climate models predict an increase of 40 per cent in rainfall in northern Kenya by the end of the century, while a regional model suggests that there may be greater rainfall in the west.

All models show that, by 2100, there will be more intense rains during the wet seasons. Floods will be more common and severe. The frequency of droughts is likely to be the same as now, but they will also be more severe due to the rise in overall temperatures. The increased severity of droughts will reduce crop yields and crop diversity, which will also have a significant impact on livestock. These conditions will lead to increased malnutrition among children, as parents are unable to feed their families. The UNDP estimates that if a child in Kenya is born in a drought year, the likelihood of them being malnourished increases by up to 50 per cent.

The Intergovernmental Panel on Climate Change (IPCC) currently predicts an 18 to 59 cm rise in global sea level by 2100. This may have a significant impact on the coastal belt in Kenya, particularly around Mombasa. This has the potential to cause increased coastal flooding and the salination of coastal agricultural land. However, model simulations show wide disagreements in projected changes in the severity of future El Niño events (Christensen et al., 2007).

The following sections analyse the situation in different areas of Kenya and look at potential steps to help families and children adapt to the impact of climate change in these areas.

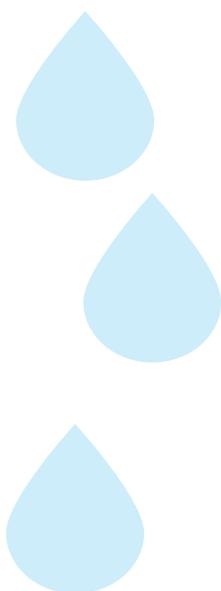
MOMBASA



FIGURE 2: Map showing Mombasa and surrounding area.

“We used to see parents going to the farm but now children just see them sitting and making charcoal.”

Female student, Mazola School, Kwale, Coast Province



PRESENT DAY

Mombasa is Kenya’s second largest city and the major port in East Africa. The city is home to around 900,000 people, and every year swelled by the many thousands of tourists who visit Mombasa’s beaches. Built on low-lying ground, much of Mombasa is close to sea level. This makes the city highly vulnerable to climate change. It has a history of weather-related disasters, particularly floods, which occur almost annually. The floods in October 2006 affected 60,000 people in the city and the surrounding Coastal Province, displacing more than 20,000 people from their homes and destroying roads and bridges. Sanitation became a particular problem, resulting in outbreaks of cholera and diarrhoea, which had a significant impact on children’s health, well-being and development.

FUTURE SCENARIOS

As we have seen above, by 2100 the IPCC predicts a global 18 to 59 cm rise in sea level. A recent report estimates that a 30 cm rise in sea level would leave 17 per cent of Mombasa under water. Salt from seawater will get into soil and contaminate drinking water. This will also harm farms around the city, reducing their capacity to grow certain crops and contributing to child malnutrition in the coastal province. Rising sea levels and storm damage will also mean more erosion of the coastline. Health risks will increase significantly, principally because a reduction in water quality leads to an increased prevalence of waterborne diseases such as diarrhoea, cholera and typhoid. These diseases are key causes of mortality in children under the age of five, and can cause long-term health impacts in affected children. Flooding can also hinder the provision of safe sanitation, further increasing children’s exposure to harmful diseases.

FIGURE 3 Projections of mean monthly high and low temperatures in Mombasa for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 4 High and low projections of the mean monthly precipitation in Mombasa for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN MOMBASA

Flooding: preparing for emergencies

UNICEF has previously run emergency preparedness programmes in local schools where there is a risk of regular disasters such as flooding. This type of programme will help children to adapt to the impacts of climate change expected in the Mombasa region. The programme offers practical guidelines to help students and teachers survive disasters, training them in understanding and recognising early warning signs, and preparing them with knowledge and skills to survive the onset of emergencies such as flooding.

Finding alternative sources of water

There is a need to find alternative sources of drinking water in order to adapt to the challenges presented by salination and contamination of groundwater caused by rises in sea level and increased flooding in the Coastal Province. Globally, UNICEF runs programmes that support the harvesting and treating of rainwater as a solution to this problem. These programmes enable communities to build tanks to collect rainwater. It takes just a few days to construct a tank for each home and the system can supply enough water for drinking and cooking for a family to last most of the year. Communities in Indonesia and Guyana, facing similar impacts of climate change to Kenya, have benefited already from such programmes, making this a viable option in Mombasa.

Idhila Mohammed carries her child on her back as she searches for food and water for her surviving cattle. "We had 180 cattle last year, but since the drought only 40 are left," she said.

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FIGURE 3: Mean high and low temperature projections for Mombasa

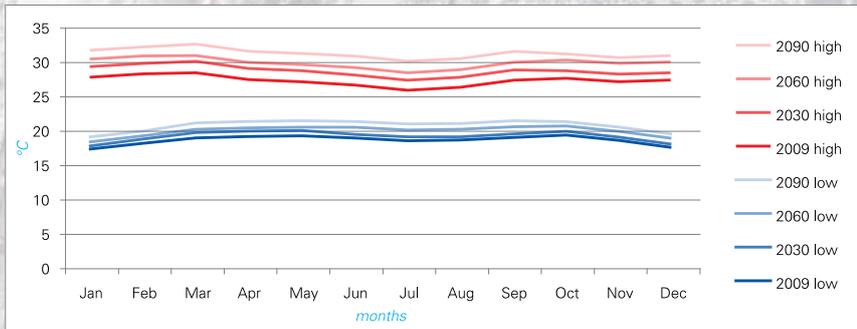
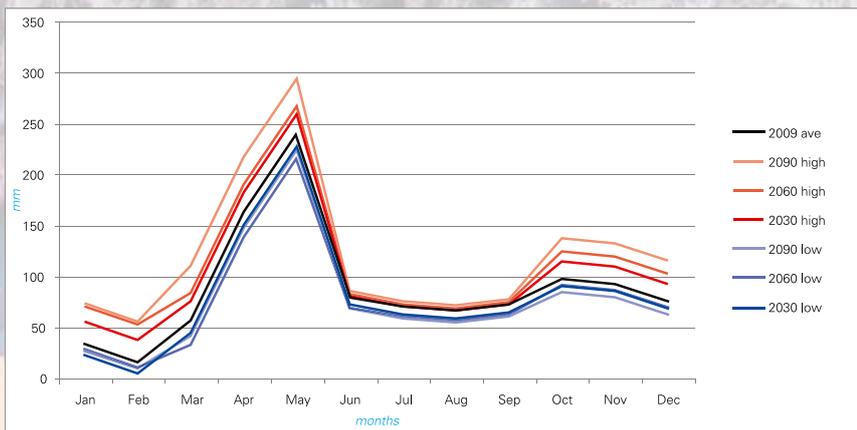


FIGURE 4: High and low projections of precipitation change in Mombasa



GARISSA



FIGURE 5: Map showing Garissa

“Our home was destroyed by the floods and we have nothing left. My parents cannot even afford to pay my older siblings’ school fees since we have no cows left to sell.”

Nixon Bwire, age 13, Tana River



PRESENT DAY

Garissa is on the River Tana in the Northeastern Province of Kenya. It is hot all year round, reaching temperatures of up to 45°C in some months. Rainfall during the long and short rainy seasons can be high, with devastating consequences. In 2006, flooding forced over 24,000 people to leave their homes in the Garissa district, and washed away more than 3,300 farms along the River Tana. Many schools were also lost. UNICEF estimates that the floods in 2006 affected 350 schools, disrupting the education of 150,000 children in the district. Floods also severely damaged many schools’ water and sanitation facilities, which in turn increased the risk of diarrhoeal diseases for students.

Most local people in Garissa are nomadic and depend on livestock farming for their livelihoods, except for the arable farmers along the River Tana. The main species of livestock are cattle, camels, goats and sheep.

FUTURE SCENARIOS

Garissa’s population, particularly children, will become more vulnerable as climate change intensifies. Temperatures will continue to rise. There will be higher variations in rainfall, with some years having very intense rains. However, it is also likely that droughts will become more intense. When this happens, it is likely that more people will migrate to the towns, as they lose their livestock and livelihoods. This could lead to increased pressure on the urban infrastructure such as water and sanitation systems, causing additional stresses on child health and well-being. Many of Garissa’s children already suffer from poor health care and protection. For example, the main causes of morbidity for under 5s are respiratory system diseases, malaria and diarrhoea. These will all increase through climate change, causing greater incidence of potentially life-threatening disease for children in the area.

FIGURE 6 Projections of mean monthly high and low temperatures in Garissa for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 7 High and low projections of the monthly mean precipitation in Garissa for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN GARISSA

Preventing waterborne diseases

The increased risk of flooding can lead to an increased risk of contaminated water, which in turn leads to the spread of waterborne diseases such as cholera and diarrhoea. This can have a severe impact on child survival. Water and sanitation facilities raised above the ground (‘step latrines’) can be built to prevent contamination by dirty floodwater. UNICEF has successfully run similar floodproof water and sanitation programmes in the Philippines and other countries regularly at risk of flooding and has found they can prevent the spread of waterborne diseases and halt potential epidemics.

Protecting migrant children

Children of migrating families who have been forced to relocate from rural to urban areas by the impacts of climate change can be extremely vulnerable and at risk of inadequate social protection. A key adaptation here would be to expand UNICEF protection programmes for migrant children in affected urban areas. UNICEF already supports child protection centres for vulnerable children in large cities such as Nairobi. The centres help children realise their basic rights, as well as provide access to essential services such as education and health care. Each day, every child receives two hot meals, a clean shower and the chance to learn and play. More of these centres will be needed if the impacts of climate change increase rural migration.



FIGURE 6: Mean high and low temperature projections for Garissa

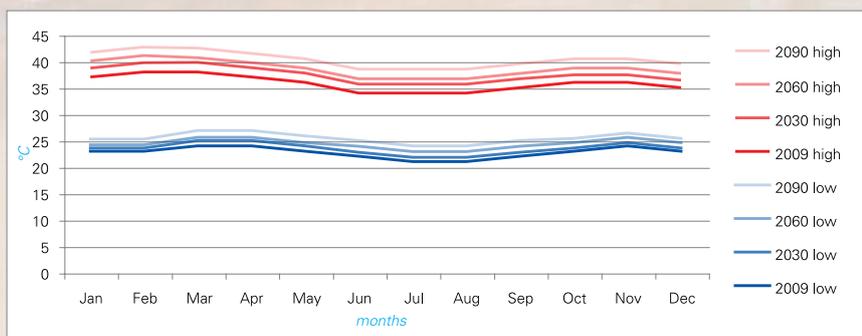
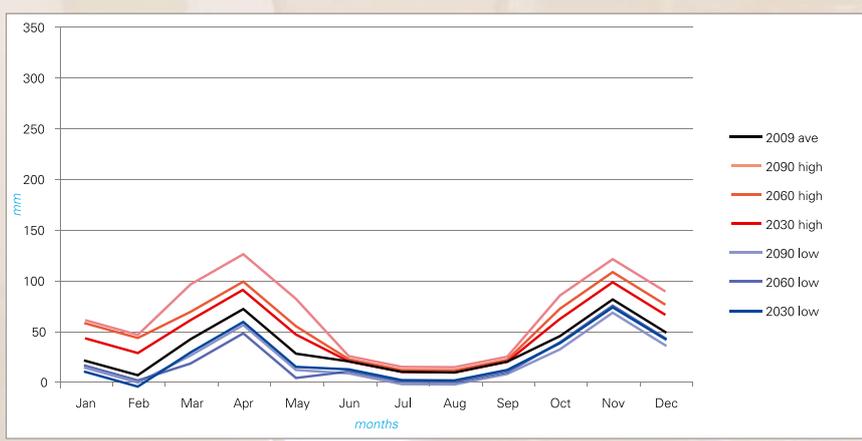


FIGURE 7: Mean high and low precipitation projections for Garissa



In 2006, floods left more than 24,000 people homeless in Garissa.
© UNICEF Kenya/2006/Abdikadir Ore

LODWAR

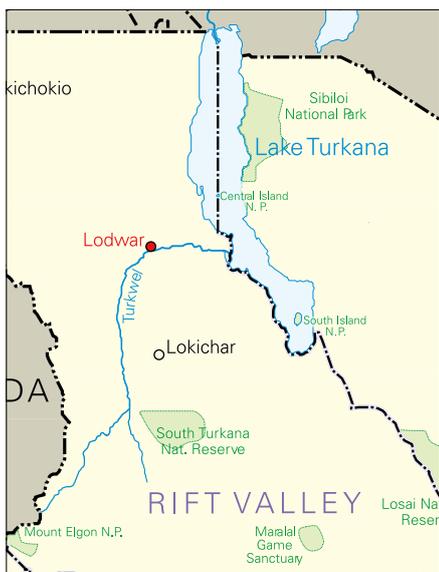


FIGURE 8: Map of Lodwar

“In the few years that I’ve been here, the climate has really changed. Temperatures have gone up. The rainfall has dropped. As time goes by, things are getting worse and worse ... It rains once in three months, that’s not normal. This has led to shortage of food and water, which has led to the death of animals. People lose their livestock and other people die due to starvation and hunger.”

Lourine Oyodah, age 15, Lodwar

PRESENT DAY

Lodwar is in the arid northwest of Kenya, to the west of Lake Turkana. In terms of climate change, it is among the most vulnerable areas of the country, with high temperatures and uncertain rains. The population is small, although the town serves a wide area populated by the Turkana people, who make their living from goats, camels and cattle, as well as from weaving baskets.

Climate change has already had a direct impact on Lodwar. Since the region is already arid, variations in rainfall can be catastrophic.

Recent droughts have killed crops and animals. This affects families’ livelihoods and consequently their ability to provide for their children. These droughts both locally and in neighbouring Ethiopia have also caused Lake Turkana to shrink. The lake has lost 3.5 metres vertical depth between 1999 and 2006, crushing the local fishing industry. Ferguson’s Gulf, a fish breeding ground and once the richest fishing site, is now dry. In the late 1970s, Lake Turkana’s catch was about 17,000 tonnes of fish. In 2005, it was less than 4,000 tonnes. The collapse of the fishing industry has intensified the levels of poverty and malnutrition around Lake Turkana.

In 2006, UNICEF treated 13,000 children under the age of five for malnutrition at relief centres in the region. Droughts and loss of livelihoods also force people to migrate into the towns. More urban migration can lead to increased pressure on the urban infrastructure and economy. This puts children at risk of poor health care, poor provision of safe water and sanitation, and volatile livelihoods

FUTURE SCENARIOS

Climate change projections show that Lodwar is likely to have one of the most variable rainfall patterns in Kenya. Although the total amount of rain may increase, periods of

drought will also become more frequent. Temperatures will also increase, intensifying the impact on Lodwar’s children.

FIGURE 9 Projections of mean monthly high and low temperatures in Lodwar for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 10 High and low projections of the mean monthly precipitation in Lodwar for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN LODWAR

Early warning systems for child malnutrition

Drought and erratic rainfall can lead to loss of livelihoods, putting children at risk of malnutrition. In response, it may be necessary to expand the early warning systems for malnutrition in children. This involves weighing and measuring children at risk of malnutrition at local health centres. Trained health workers examine each child and, if necessary, provide nutrient-rich food to address early signs of malnutrition. This means that the effects on child health and nutrition caused by climate change can be identified early and interventions made to prevent the most negative impacts on children in Lodwar.

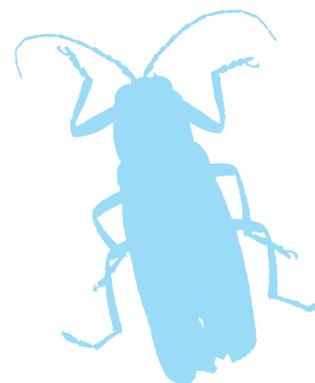


FIGURE 9: Mean high and low temperature projections for Lodwar

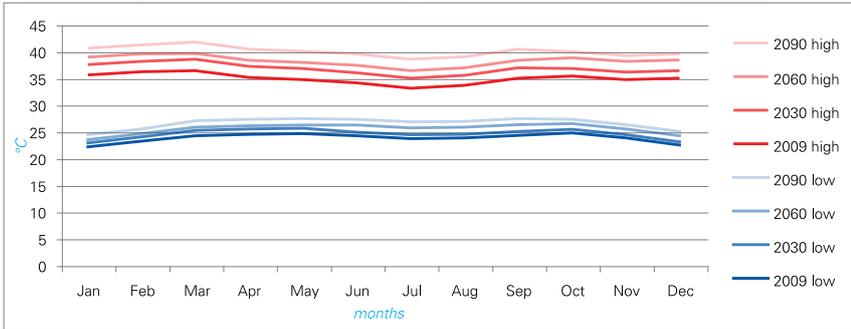
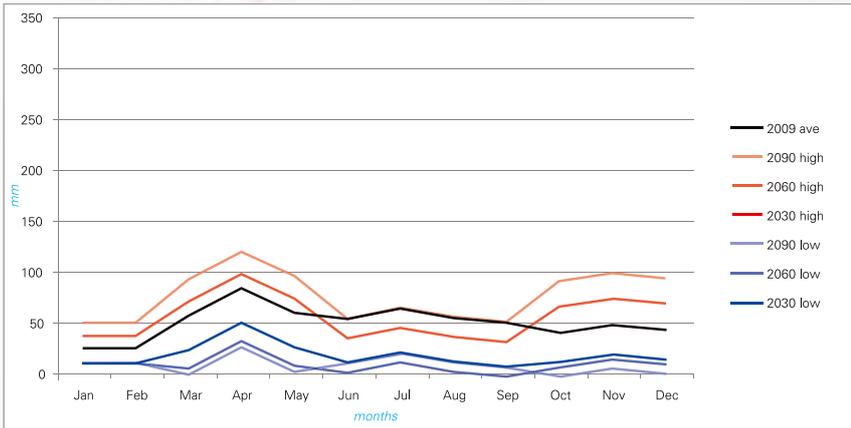
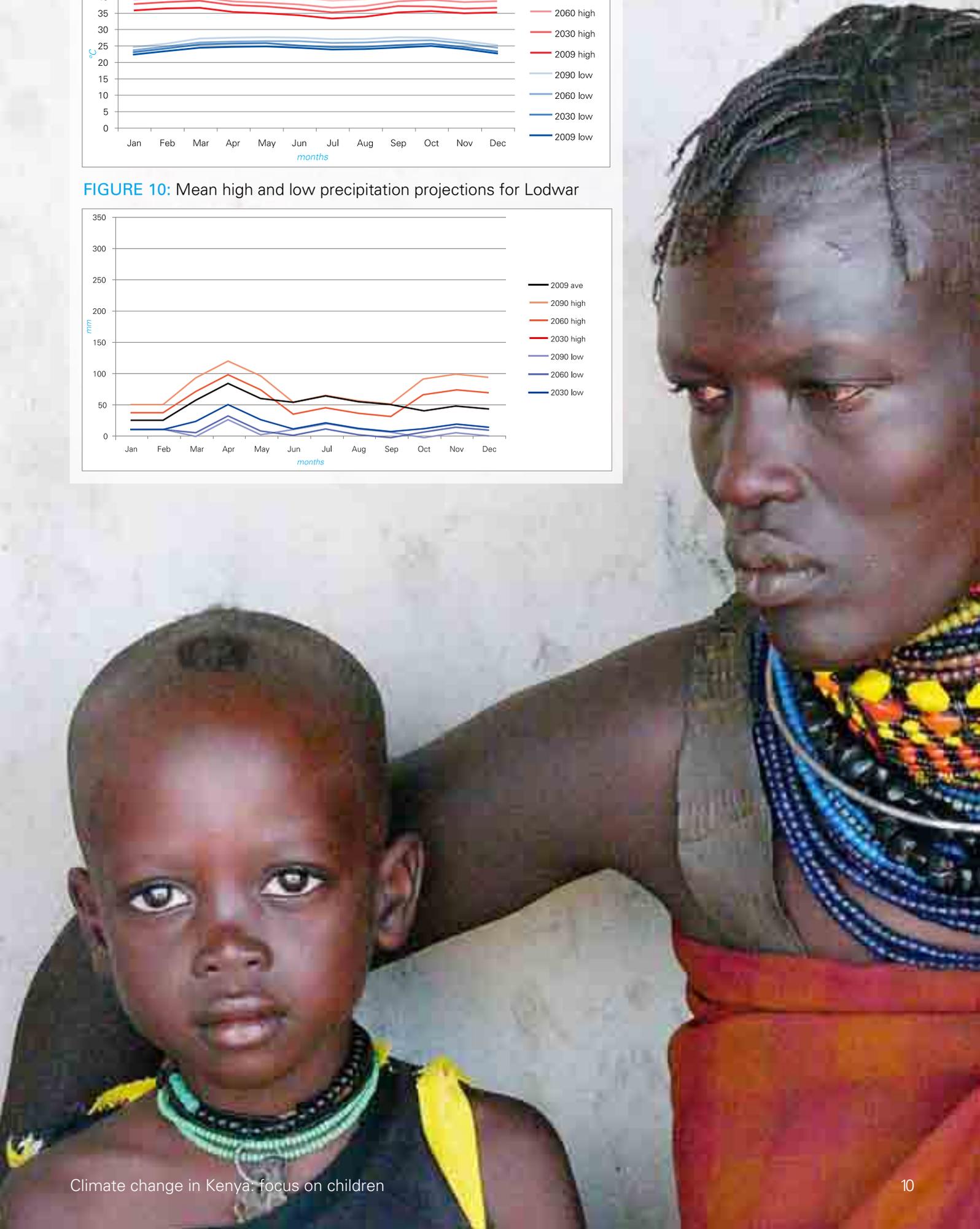


FIGURE 10: Mean high and low precipitation projections for Lodwar



Loreng, age 4, was one of 13,000 children under the age of 5 treated for malnutrition in Lodwar in 2006.

© UNICEF UK/Kenya06/Christian Humphries



NAIROBI



FIGURE 11: Map of Nairobi

“Climate change is affecting us and in the future if we are not involved, we will live in a desert, so we have to do something now so that we prevent our land from becoming a desert. The rivers have dried up and sand mining has increased, this has caused many children to drop out of school to work in mines in loading the vehicles.”

Samuel, age 14, Machakos

PRESENT DAY

Nairobi, capital of Kenya and the largest city in East Africa, has more than two million inhabitants. Nairobi is also the main economic centre for East Africa. Many of the city’s population live in Kibera, the second biggest slum on the continent.

Although it is near the equator, the city has a pleasant climate for most of the year because it is about 1,700 metres above sea level. June and July are the coolest months.

The environment is under particular pressure as the city expands rapidly. In particular, finding land for housing and the management of waste and water is proving a challenge. This leads to the development of cramped, overcrowded slums such as Kibera, where there is poor access to water, health care and education for families and children. This has short-term and long-term impacts on child health, development and well-being.

FUTURE SCENARIOS

Predictions show that Nairobi will become warmer and wetter this century, although the timing of the rainy seasons will remain unchanged. Climate change will have a less direct impact in Nairobi than in many other parts of Kenya, although some predictions warn that malaria will become common. However, climate change could have a major indirect effect on Nairobi, as it is likely that more people will come to the capital to seek work as climate change drives people from other parts of the country. This will increase the pressure on the city’s infrastructure and economy. This could put children at risk of poor health care, poor provision of safe water and sanitation, and volatile livelihoods. Moreover, increased migration to Nairobi could exacerbate existing problems facing children in the capital. UNICEF currently estimates that less than half of children in Kibera even start secondary school. The numbers of children lacking basic education and health care

could increase as more families migrate to the capital to escape the direct impacts of climate change elsewhere.

FIGURE 12 Projections of mean monthly high and low temperatures in Nairobi for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 13 High and low projections of the mean monthly precipitation in Nairobi for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN NAIROBI

Protecting children through child-friendly schools

UNICEF’s Child-Friendly Schools Initiative aims to improve the quality of education in primary schools through the implementation of an integrated package of school interventions and quality standards. The package of school interventions covers five main areas: education; water, sanitation and hygiene; health; protection of vulnerable children; and community participation. The initiative promotes caring for the physical, psychological and emotional well-being of every child, with special attention to vulnerable children and girls. In collaboration with local health authorities, the child-friendly schools facilitate access to primary health care. Mobile health units often come to the schools to provide regular vaccinations and nutritional screening. Such child-friendly schools could be established in Nairobi to act as a ‘safety net’ for the most vulnerable children affected by climate change.

A boy walks along a muddy alley strewn with excrement and garbage in Kibera, a slum area of Nairobi. Over 1 million people live in extreme poverty in Kibera. It has no public health care facilities, sanitation, electricity, water or roads.
 © UNICEF/HQ06-0187/Kamber

FIGURE 12: Mean high and low precipitation projections for Nairobi

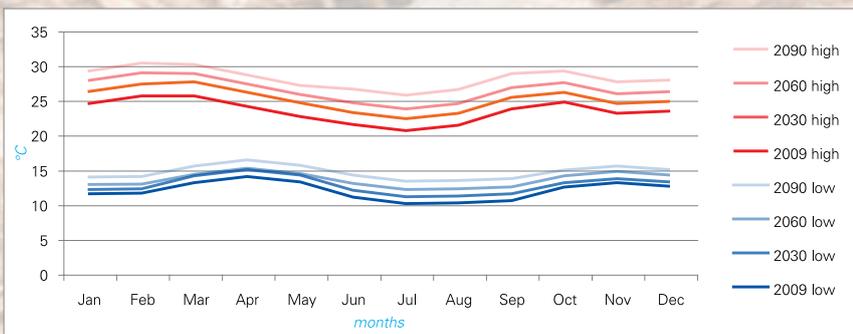


FIGURE 13: Mean high and low precipitation projections for Nairobi



KISUMU



FIGURE 14: Map showing Kisumu

“Recently the harvest has reduced ... I know some children who have dropped out of school. They say they cannot concentrate in class because they are hungry. We have just one or two meals per day because food is expensive. A kilo of maize flour increased from 35 to 70 shillings, and my mother said it will get worse.”

Water is also scarce because of lack of rain. Those living far from the lakes walk so far in search of water. The local authorities do not treat water as efficiently as they used to. The water is dirty and contaminated and people get bilharzia.”

Justus Barasa, age 14, Budalangi

PRESENT DAY

Kisumu is in Nyanza Province, western Kenya. A port on the banks of Lake Victoria, Kisumu has a population of nearly 400,000 people and is the third largest city in Kenya. Many people live on land reclaimed from the lake.

The surface temperature of Lake Victoria has been warming since the 1960s. Studies suggest that continued warming will have a considerable impact on the ecology of the lake, which is the main source of food and livelihood for many of the families in Kisumu.

FUTURE SCENARIOS

Climate change may cause the amount of rainfall in the Lake Victoria basin to fluctuate, which will have a direct impact on the water levels in Lake Victoria. One prediction is that the level of the lake will fall by the 2030s, then rise again by the 2080s.

Perhaps the most immediate impact of climate change around Kisumu will be an increase in malaria and waterborne diseases. Kisumu lies about 1,100 metres above sea level. Studies have shown that East African highland communities living at altitudes above 1,100 metres and along the lake shore are more vulnerable to malaria and cholera epidemics due to climate variability, lack of immunity, and increased poverty. In these situations, children will be the most vulnerable section of the population. The risk of malaria is significantly worse in years affected by El Niño. Malaria and cholera epidemics will undoubtedly put children’s lives at risk, as well as creating long-term health impacts that could impede their overall development. Malaria also poses grave threats to pregnant women and their unborn babies by increasing the risk of maternal death, spontaneous abortion, maternal anaemia, and low birth weight.

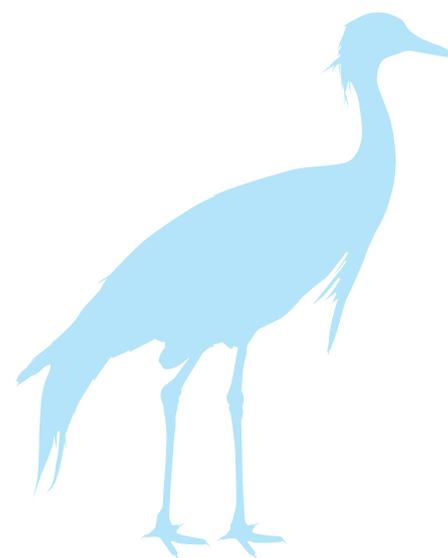
FIGURE 15 Projections of mean monthly high and low temperatures in Kisumu for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 16 High and low projections of the mean monthly precipitation in Kisumu for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN KISUMU

Expanding programmes to prevent malaria

The scale and scope of existing malaria prevention programmes needs to be expanded in order to tackle the increased risk of malaria posed by climate change. This would entail increasing UNICEF’s existing distribution of insecticide treated mosquito nets via routine health services and campaign approaches in the region. UNICEF’s previous experience of distributing these nets in rural Kenyan regions shows that the use of nets led to a 44 per cent reduction in the number of child deaths.



ARDWORK
UMILITY
OLERANC
ELF DRIVE
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Justus Barasa from Budalangi has seen the increase in disease, malnutrition and loss of livelihood caused by changes in climate around Lake Victoria.

© UNICEF/François d'Elbe

FIGURE 15: Mean high and low temperature projections for Kisumu

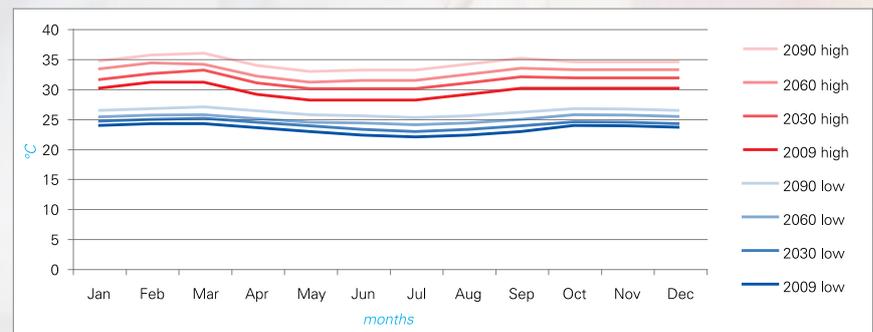
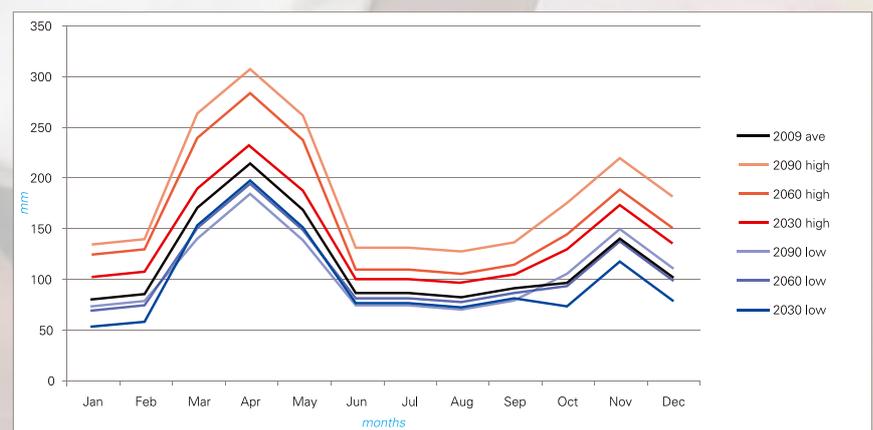


FIGURE 16: Mean high and low precipitation projections for Kisumu



NAKURU

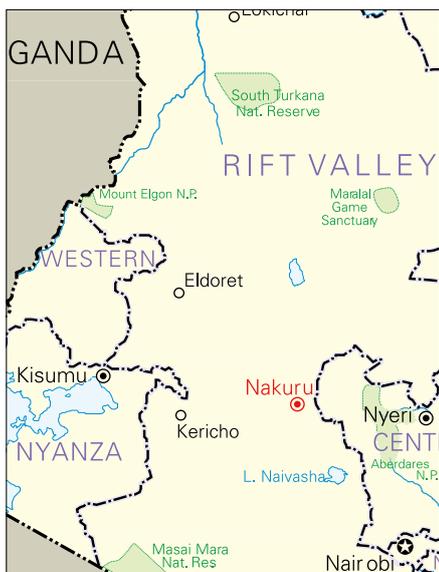


FIGURE 17: Map of Nakuru

"I have lived here for seven years. Before there was rain, but now the rain is reducing and reducing ... There weren't so many street boys before but now there are a lot of street boys because there isn't enough food."

Jack Waigwa, age 15, Nakuru

"The climate is changing. My father owns a farm which he manages with my uncle. They grow fruits, maize, tea and beans. This year we are not getting any harvests. This means we will spend more money to buy food and not have money for other things like rent, electricity, clothes."

Fiona Wambwa, age 13, Nakuru

PRESENT DAY

Nakuru is the capital of Rift Valley Province. It is the fourth largest city in Kenya, with around 300,000 inhabitants. As well as being an important regional hub, Nakuru is also a centre for education and tourism.

The town lies to the north of the ecologically important Lake Nakuru. Lake Nakuru National Park is the first park in Africa recognised as an Important Bird Area by Birdlife International. It is the most visited national park in Kenya, receiving more than 1,000 tourists each day. Lake Nakuru is home to more than 450 different bird species, in particular 1.5 million pink flamingos, as well as marabou storks, pelicans, yellow billed storks and Egyptian geese. Other animals, such as white rhino and buffalo, also live by the shores of the lake.

However, the lake is shrinking fast. The Kenya Wildlife Services report that 20 years ago the lake was 2.6-metres deep. Now it is only 1.4-metres deep. The three rivers that feed the lake are drying up, due to the pressure of land use upstream in the Mau Forest and the impact of climate change. Competition between people, birds and animals is increasing in Nakuru, as water in the underground rocks is pumped up by those who need it to drink.

FUTURE SCENARIOS

Projections indicate that Nakuru will get warmer through climate change, and is likely to get wetter; overall rainfall will increase. However, the demands made on the environment by people will also increase unless there is active management of the land use around the lake and the rivers that feed it. The decline in biodiversity and the shrinking of Lake Nakuru could have several impacts that will affect children in the region. The loss of biodiversity and the lake's decline could lead to a reduction in tourist income, which will potentially cause loss of income and an increase in unemployment.

As a result, there could be an increase in the number of children living in poverty. A decline in family income could also force families to take their children out of school and into work, reducing children's life chances.

The decline in biodiversity and bird species could also affect cultural heritage in the region. Dramatic changes to biodiversity, such as species loss or changing migratory patterns of birds, can have an impact on cultural traditions and knowledge, as these may no longer be passed down to future generations of children.

FIGURE 18 Projections of mean monthly high and low temperatures in Nakuru for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 19 High and low projections of the mean monthly precipitation in Nakuru for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN NAKURU

Providing alternative water sources

Increased water stress caused by erratic rainfall patterns will create a need for alternative sources of water. As described earlier, one option that UNICEF promotes in other countries experiencing the impacts of climate change is to expand rainwater harvesting programmes. Rainwater harvesting provides a consistent source of water in times of low rainfall. The programme could be integrated into Nakuru's schools, so children have a safe and ready supply of drinking water and basic sanitation facilities at school. School-based water and sanitation programmes also have the benefit of encouraging parents and the community to support children going to school as this may be the best or only source of improved water.

A boy drinks from a small pool that is the sole water source for 300 people.
 © UNICEF/HQ06-0177/Kamber

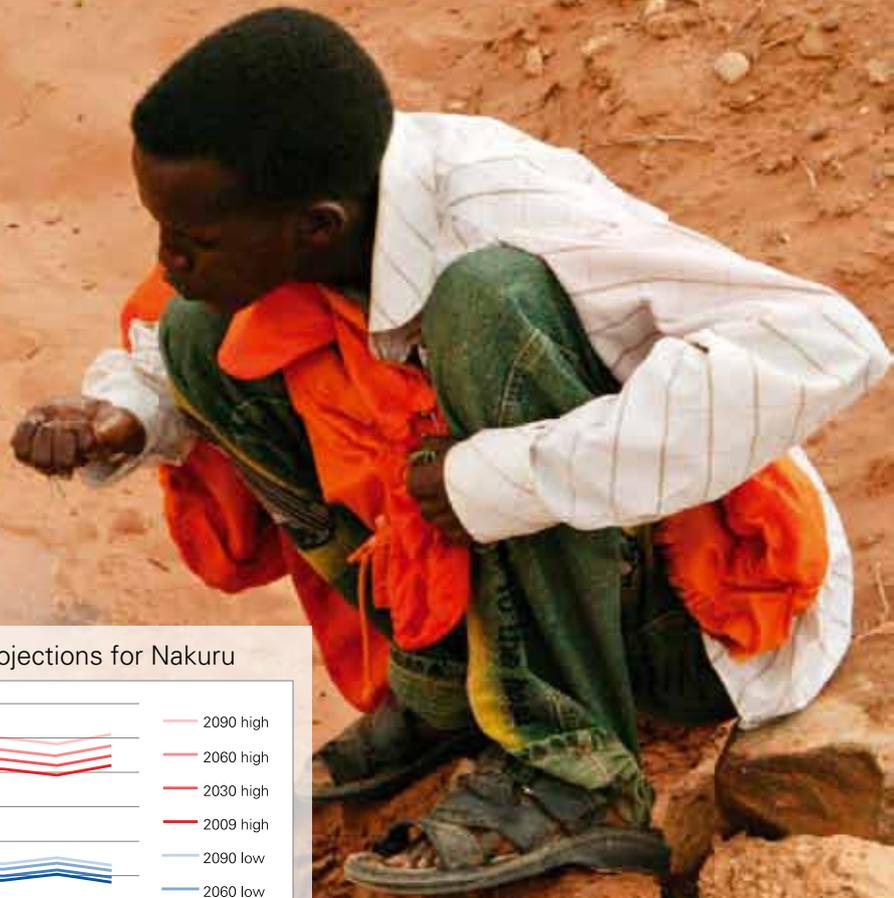


FIGURE 18: Mean high and low temperature projections for Nakuru

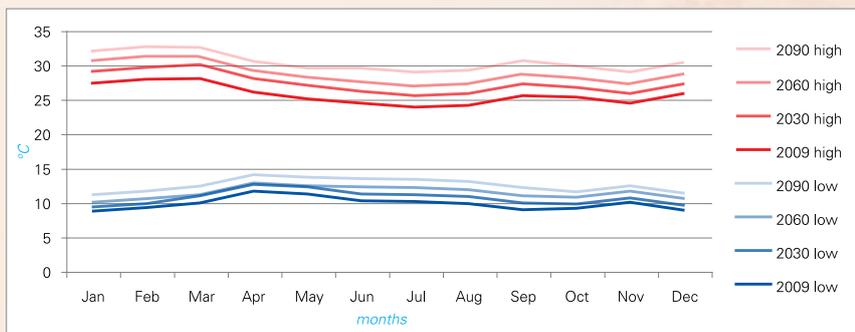
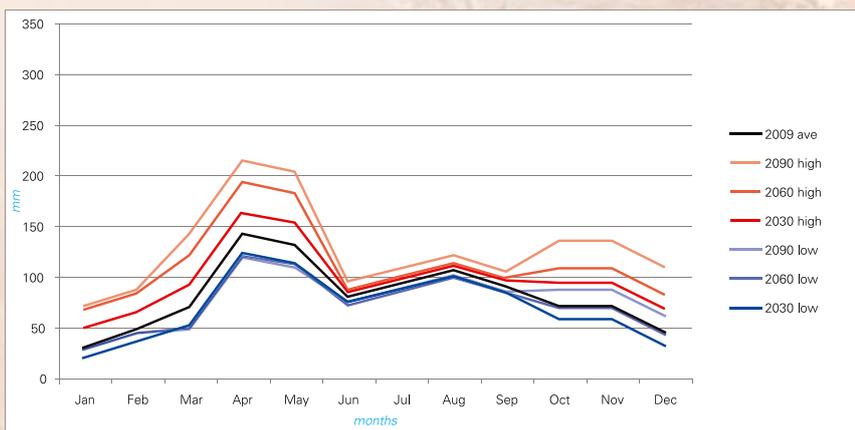


FIGURE 19: Mean high and low precipitation projections for Nakuru



KERICHO



FIGURE 20: Map showing Kericho

“Farmers plant their crops but ... when the rain is expected to come, it does not. This causes hunger to most families, especially those that depend on farming. My friends and classmates ... will be eating less food day by day. They can't afford new clothes and have to wear small clothes.”

Naomi Chepkemoi, age 13, Kericho



PRESENT DAY

The southwestern district of Kericho is home to Kenya's biggest water catchment area, the Mau Forest, which has suffered from significant deforestation and environmental degradation. Kericho town has an urban population of 45,000 and the total population of the district is more than 500,000.

Local people have seen changes in Kericho's climate. Rising temperatures and uncertain rainfall patterns are harming their health and reducing crop yields. Twenty years ago, cooler temperatures meant mosquitoes carrying malaria could not survive. Since the 1980s, however, temperatures have become warmer and people are now dying from the disease.

Kericho's high altitude of 2,133 metres (7,000 feet) and the fact that it rains almost every day makes it the heart of the Kenyan tea industry. Tea is a key part of the Kenyan economy. The country is the second largest exporter of tea in the world, and tea provides one quarter of Kenya's export income. However, the rise in temperatures has already affected tea production.

FUTURE SCENARIOS

Climate change will mean that rainfall will increase in Kericho, but it will be more uncertain, and at times more intense. Flooding will become more common, and if there are dry periods, temperatures will also be hotter. Overall, temperatures will get much warmer.

Studies have highlighted how sensitive tea production is to climatic variations. Increases in temperature will change the areas where it is possible to grow tea, pushing growers to higher altitudes. Increased intensity of rainfall will tend to wash soils away more easily. If, as the models predict, temperatures rise in Kenya by 2°C by 2050, many current tea-producing areas of Kenya will no longer be able to grow the crop.

Kericho will be one of the areas of Kenya most adversely affected by this climate change scenario. Climate change will have a direct impact on the income and livelihoods of families in the region, affecting their ability to provide for their children and making them more vulnerable. It could potentially lead to an increase in child malnutrition and childhood poverty in Kericho. A decline in family income could also encourage families to take their children out of school and put them into work, reducing children's life chances.

FIGURE 21 Projections of mean monthly high and low temperatures in Kisumu for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 22 High and low projections of the mean monthly precipitation in Kericho for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN KERICHO

Protection against malaria for children and mothers

Several adaptation measures can be taken to protect children from the increased prevalence of malarial mosquitos in Kericho as a result of the changing climate. As mentioned, insecticide treated nets are a highly effective method of protecting families from contracting malaria. Net distribution can also be accompanied by preventive treatment for pregnant women in regions such as Kericho. The treatment consists of at least two doses of anti-malarial medicine during the second and third trimesters of pregnancy. This intervention is safe and highly effective in reducing the proportion of women with anaemia and placental malaria infection at delivery, thus improving child survival in the face of malaria.

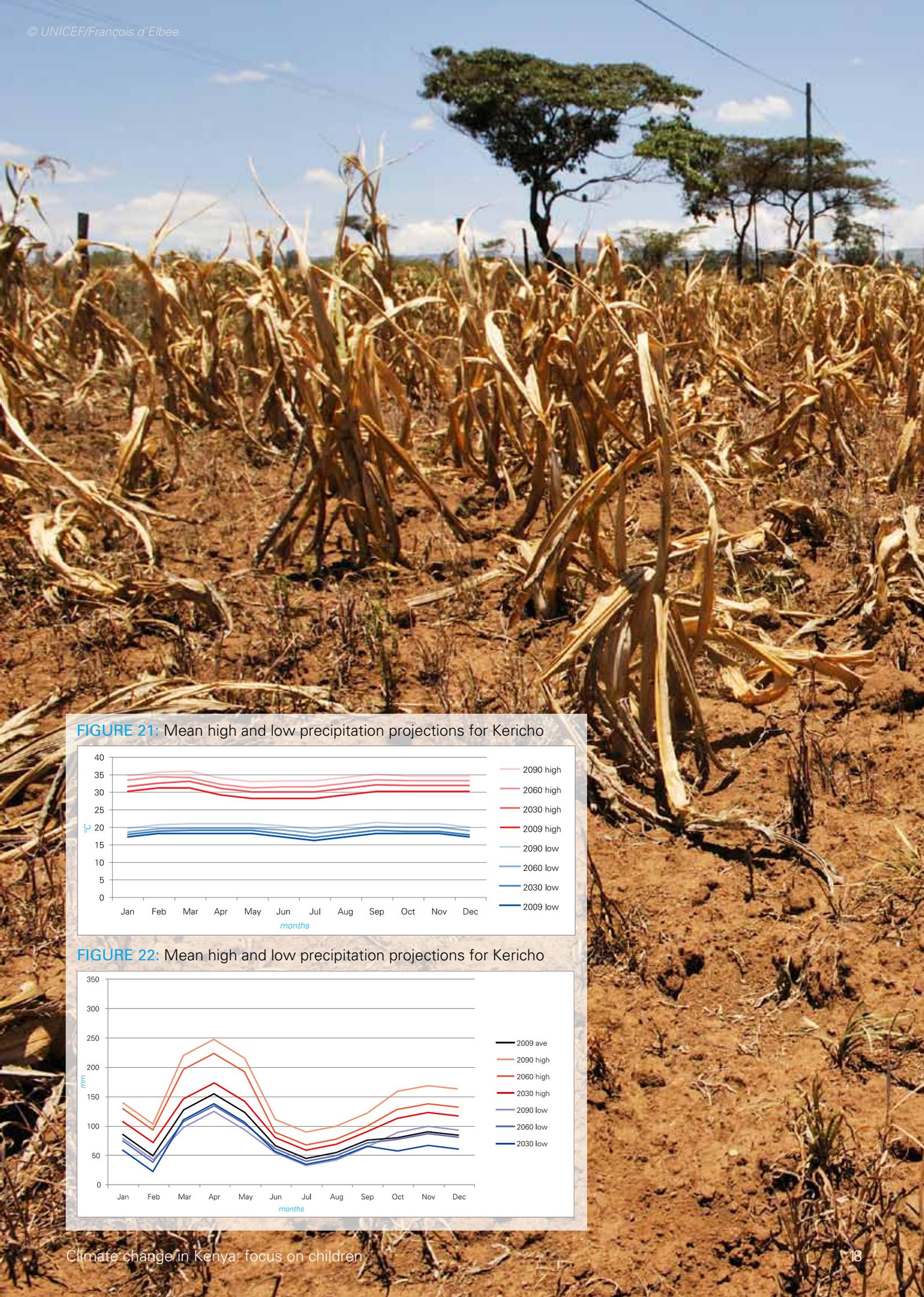


FIGURE 21: Mean high and low precipitation projections for Kericho

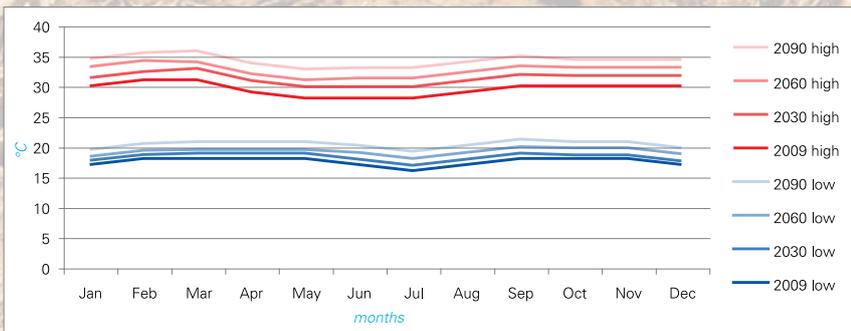
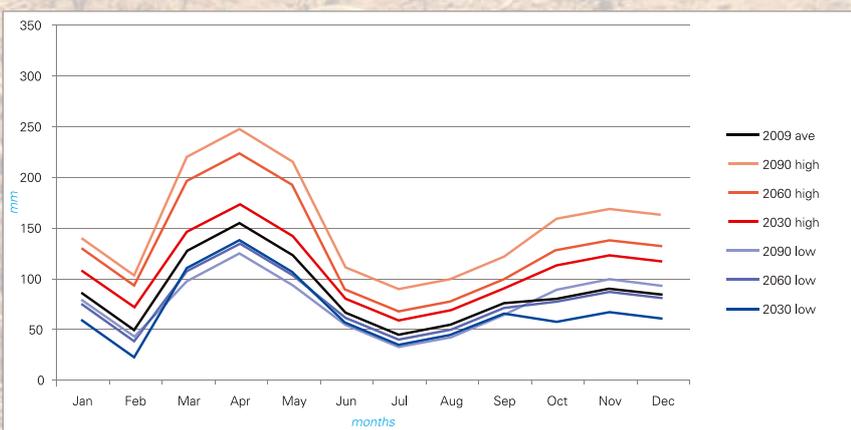


FIGURE 22: Mean high and low precipitation projections for Kericho



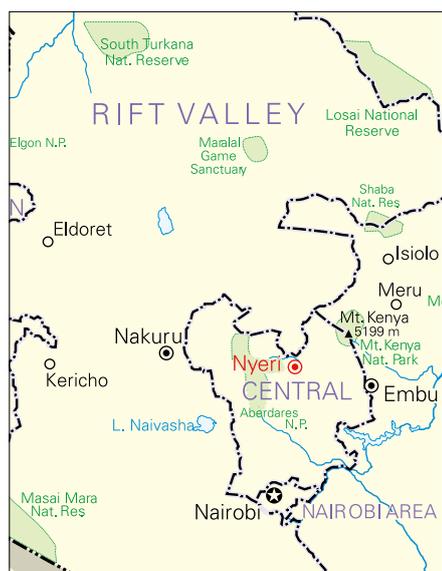


FIGURE 23: Map of Nyeri

PRESENT DAY

Nyeri, provincial capital of Central Highlands province is a city of about a quarter-of-a-million people in Kenya's fertile central highlands, north of Nairobi. The main industry in Nyeri is farming. The principal crops are coffee and tea, most of which are grown by smallholders. Other food crops include maize, beans, potatoes, tomatoes, cabbage, spinach and kale. Livestock such as dairy cattle, goats, sheep and chickens are also widely kept.

FUTURE SCENARIOS

Coffee production is highly sensitive to temperature fluctuations. When temperatures are warmer, coffee ripens more quickly, leading to a drop in quality. If temperatures reach those predicted for Nyeri, models show there will be significant reductions in coffee production by 2020.

Recent studies suggest that coffee growers have to plant at higher altitudes due to climate change. On average, production is moving up by three to four metres every year. Pests that harm both plants and animals are increasing, leading to reduced yields. Small farmers, who produce most of the coffee in Kenya, "could see their annual incomes slashed by up to 90 per cent over the next decade or so." This will have a negative impact on local livelihoods, and consequently could mean more children are at risk of malnutrition and extreme poverty.

FIGURE 24 Projections of mean monthly high and low temperatures in Kisumu for 2030, 2060 and 2090, as well as the actual mean monthly temperatures for 2009.

FIGURE 25 High and low projections of the mean monthly precipitation in Kericho for 2030, 2060 and 2090, as well as the actual mean monthly precipitation in 2009.

ADAPTING TO CLIMATE CHANGE IN NYERI

Early warning systems for child malnutrition

As mentioned previously, drought and erratic rainfall can lead to loss of livelihoods, putting children at risk of malnutrition. A similar adaptation programme around early warning systems for child malnutrition suggested for Lodwar could also be followed in Nyeri. This provides an adaptation response to prevent the potential for mass malnutrition that could occur as a result of the uncertain climatic challenges facing Nyeri.

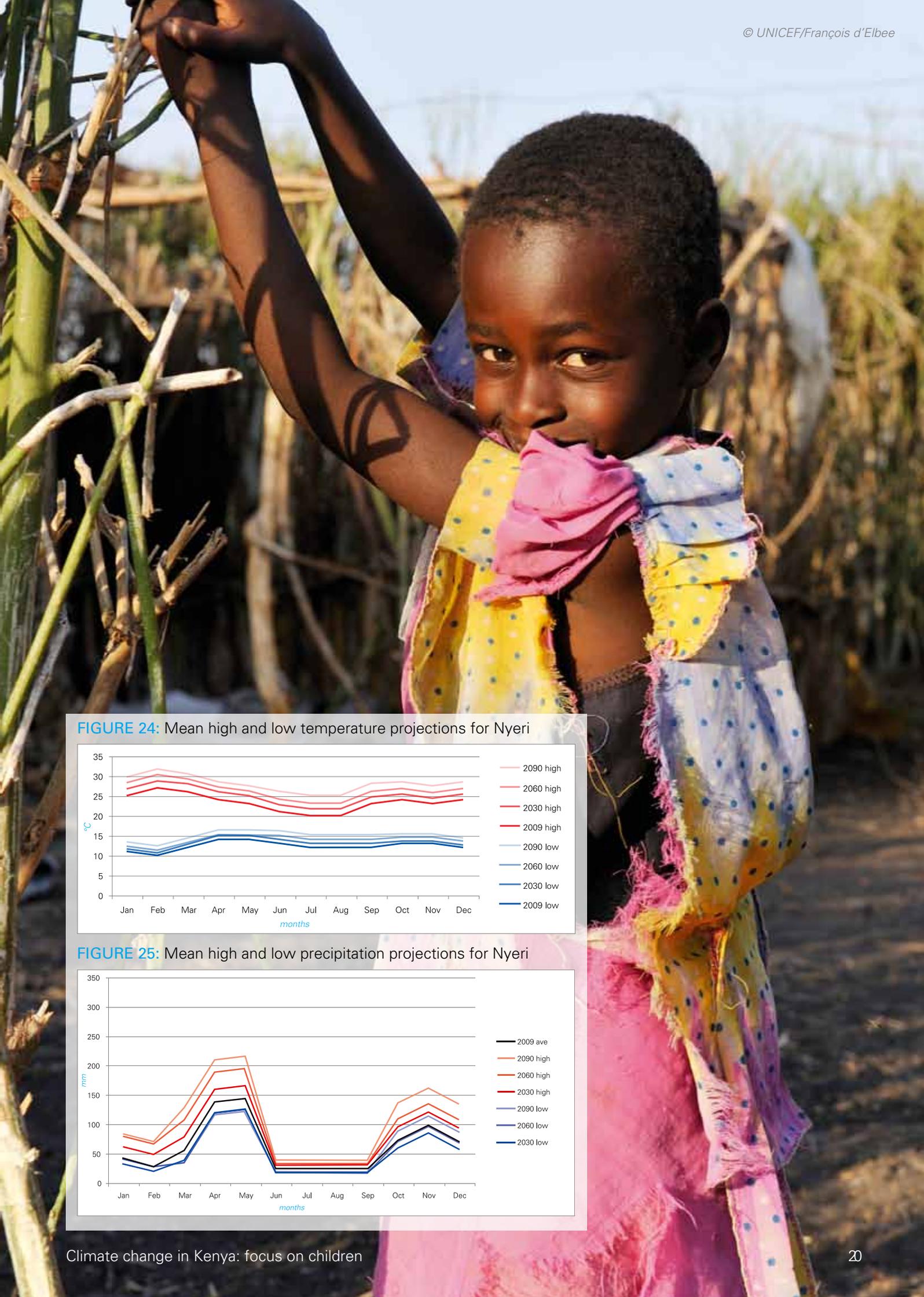


FIGURE 24: Mean high and low temperature projections for Nyeri

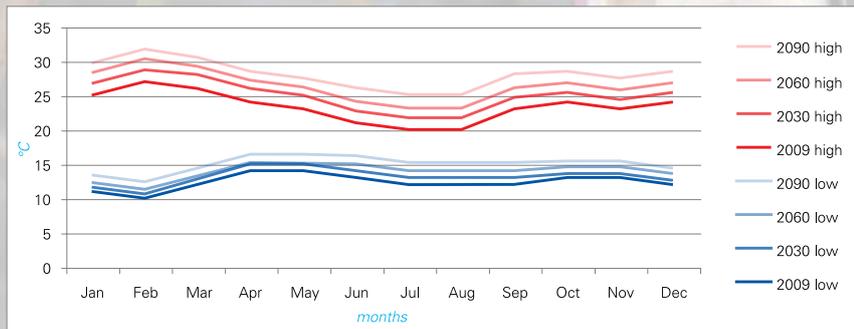
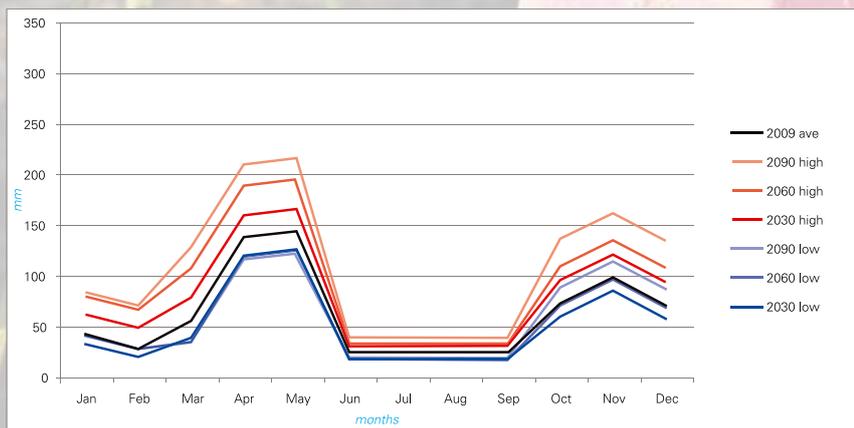


FIGURE 25: Mean high and low precipitation projections for Nyeri



CONCLUSION

A small boy sits on a dirt track by a rubbish dump in Kibera, a crowded slum area of Nairobi.

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This case study shows that climate change is a key issue for Kenya's children. Climate change is threatening child survival and development now, and it will continue to do in the future as climatic challenges intensify and cause increasing risk and uncertainty.

At the same time, there is tremendous opportunity to ensure that the next generation is equipped with the skills and knowledge to not only survive, but also thrive within the environmental challenges.

CURRENT IMPACTS OF CLIMATE CHANGE

As outlined in this study, climate change is already having a significant effect on children's well-being in Kenya in each of the focus regions studied. These current impacts of climate change in Kenya include:

- More 'hot days' per year (the equivalent of a rise of 15 per cent between 1960 and 2003): this is thought to be a contributing factor to the spread of malaria to new areas of the country.
- Prolonged droughts, erratic rainfall and drying up of rivers and streams: this leads to a decline in drinking water supply, harvest losses, food shortages, loss of biodiversity, landslides and soil degradation. This is already having an impact on child survival and development, with reduced access to clean water, increased malnutrition, and children taken out of school because of poor health or the need to supplement the family's income.
- Flooding has already become more frequent in parts of Kenya: this has multiple impacts on children – destroying homes and schools, reducing the quality of drinking water, and increasing risk of disease.

FUTURE IMPACTS OF CLIMATE CHANGE

The climate models in this study show that, without support to adapt, climate change will continue to affect Kenya's children in the future, with many current impacts increasing in intensity. The key future challenges due to climate change can be summarised as follows:

- Certain areas of Kenya will see increased rainfall in coming years. Northern Kenya and western Kenya are likely to see increased rainfall of up to 40 per cent. This presents challenges caused by flooding, but also opportunities for rainwater harvesting and storage as a clean source of water.
- At the same time, droughts will become more common in other areas, reducing crop yield and affecting livestock, with subsequent impacts on child malnutrition.
- The pastoralist culture is likely to be threatened in north-east Kenya. Children will be more vulnerable to violence as conflict over water resources increases. Here and elsewhere in Kenya, it is likely that urbanisation will increase, putting pressure on health services and other infrastructure to meet the needs of children.
- The coastal area of Mombasa, a popular tourist destination, is likely to suffer from rising sea levels that will erode the seashore and submerge parts of the city, putting children's lives at risk. As extreme weather patterns increase in Kenya, preparing communities and children for emergencies and reducing the risk of damage by constructing flood resistant school buildings, for example, will become increasingly important.

- Although climate change will not have such a direct impact in the capital Nairobi as in other parts of Kenya, it is likely that more people will come to the capital to seek work as climate change drives them from other parts of the country. This will increase the pressure on the urban infrastructure and economy, putting children at risk of poor health care, poor provision of safe water and sanitation, and vulnerable livelihoods. More migration to Nairobi may also exacerbate the existing problems facing children in the capital. These problems could also be replicated in other large cities in Kenya, as increasing livelihood uncertainty as a result of climate change forces people to cities from rural areas.
- Early warning systems for malnutrition to ensure preventative measures to counter the impact of food insecurity on children,
- Rainwater harvesting and flood proof sanitation to guarantee safe sources of drinking water, prevent adverse health risks to children and to stop the spread of disease.
- An increase in the number of child friendly schools and child protection centres in key regions of Kenya to ensure that children have the right services in place to meet their needs in the face of livelihood insecurity and the increasing rural to urban migration that may be triggered by climatic challenges

ADAPTATION

The impacts outlined above necessitate a comprehensive expansion of adaptation programming in Kenya in order to respond to the impact of climate change both now and in the future. We urgently need this expansion to ensure that children are not vulnerable to the worst impacts of climate change,

Moreover, expansion of adaptation programmes to respond to the impacts of climate change now will put communities in good stead to cope with the increasing intensity of impacts predicted for the future.

To safeguard the rights of children in Kenya, we require a range of these programmes to provide children and communities with the support, skills and infrastructure they need to survive and develop in the face of climatic uncertainty. These programmes could include UNICEF interventions such as:

- Increased health prevention programmes to combat the migration of disease vectors to new regions and to prevent an increase of disease in existing regions because of climatic changes. For instance, an expansion in distribution of insecticide treated mosquito nets will help address the greater risk that increased malarial prevalence presents to child health.

APPENDIX

I) MOMBASA

Table 1: Mean monthly high and low temperature in Mombasa in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	32.0	32.3	32.6	31.2	29.3	28.4	27.7	27.9	28.8	29.6	30.6	31.6
Average low °C	23.2	23.6	24.2	23.9	22.7	21.3	20.4	20.3	20.8	22.0	23.1	23.3

Table 2: Projected temperature change in Mombasa (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.1 (0.7 to 1.4)	1.0 (0.5 to 1.4)	1.1 (0.6 to 1.6)	1.2 (0.6 to 1.6)	1.1 (0.7 to 1.3)
2060	2.2 (1.6 to 2.7)	2.1 (1.2 to 2.9)	2.2 (1.6 to 2.6)	2.3 (1.7 to 3.2)	2.2 (1.7 to 2.6)
2090	3.6 (2.7 to 4.3)	3.6 (2.2 to 4.4)	3.7 (2.9 to 4.4)	3.7 (2.9 to 4.7)	3.7 (2.5 to 4.3)

Table 3: Mean monthly precipitation in Mombasa in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	32.0	32.3	32.6	31.2	29.3	28.4	27.7	27.9	28.8	29.6	30.6	31.6

Table 4: Projected precipitation change in Mombasa (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-5 to 6)	4 (-11 to 22)	1 (-13 to 19)	-1 (-8 to 0)	6 (-7 to 17)
2060	3 (-7 to 12)	9 (-5 to 37)	3 (-24 to 27)	-1 (-10 to 2)	4 (-6 to 27)
2090	8 (-4 to 31)	21 (-7 to 40)	7 (-16 to 54)	-1 (-12 to 5)	15 (-13 to 40)

II) GARISSA

Table 5: Mean monthly high and low temperature in Garissa in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	37	38	38	37	36	34	34	34	35	36	36	35
Average low °C	23	23	24	24	23	22	21	21	22	23	24	23

Table 6: Projected temperature change in Garissa (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.2 (0.8 to 1.5)	1.1 (0.6 to 1.7)	1.3 (1.0 to 1.8)	1.2 (0.8 to 1.7)	1.1 (0.6 to 1.4)
2060	2.3 (1.7 to 2.7)	2.1 (1.2 to 3.1)	2.4 (1.6 to 2.7)	2.5 (1.9 to 2.7)	2.2 (1.6 to 2.7)
2090	3.7 (2.7 to 4.5)	3.5 (2.3 to 4.7)	3.8 (2.9 to 4.5)	3.9 (3.0 to 4.5)	3.6 (2.4 to 4.5)

Table 7: Mean monthly precipitation in Garissa in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	20.2	5.7	41.3	71.2	27	19.6	9.1	8.6	19.1	44.3	80.4	48.3

Table 8: Projected precipitation change in Garissa (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-3 to 9)	4 (-12 to 15)	2 (-14 to 23)	0 (-8 to 2)	8 (-8 to 16)
2060	3 (-1 to 14)	6 (-6 to 23)	4 (-15 to 28)	0 (-8 to 3)	6 (-3 to 30)
2090	11 (1 to 29)	18 (-1 to 31)	13 (-13 to 41)	0 (-5 to 8)	24 (0 to 61)

III) LODWAR

Table 9: Mean monthly high and low temperature in Lodwar in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	35.6	36.2	36.4	35.1	34.7	34.1	33.1	33.6	35	35.4	34.7	35
Average low °C	22.1	23.2	24.2	24.5	24.6	24.2	23.7	23.8	24.3	24.8	23.8	22.5

Table 10: Projected temperature change in Lodwar (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.2 (0.9 to 1.8)	1.2 (0.8 to 1.9)	1.2 (1.0 to 2.1)	1.3 (0.7 to 1.9)	1.1 (0.6 to 1.4)
2060	2.5 (1.8 to 3.2)	2.4 (1.4 to 3.3)	2.4 (1.6 to 3.2)	2.6 (2.0 to 3.3)	2.2 (1.7 to 3.4)
2090	3.8 (2.7 to 5.0)	3.7 (2.3 to 5.0)	4.0 (2.8 to 5.3)	4.1 (3.1 to 5.4)	3.4 (2.5 to 4.5)

Table 11: Mean monthly precipitation in Lodwar in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	8	8	21	48	24	9	19	10	5	9	17	12

Table 12: Projected precipitation change in Lodwar (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	4 (-4 to 29)	2 (-24 to 15)	2 (-18 to 34)	-0 (-4 to 43)	11 (-5 to 29)
2060	9 (-1 to 31)	12 (0 to 27)	14 (-18 to 48)	-4 (-10 to 24)	18 (-5 to 55)
2090	21 (3 to 48)	11 (0 to 40)	25 (-24 to 70)	-9 (-1 to 44)	38 (-14 to 80)

IV) NAIROBI

Table 13: Mean monthly high and low temperature in Nairobi in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	24.5	25.6	25.6	24.1	22.6	21.5	20.6	21.4	23.7	24.7	23.1	23.4
Average low °C	11.5	11.6	13.1	14	13.2	11	10.1	10.2	10.5	12.5	13.1	12.6

Table 14: Projected temperature change in Nairobi (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.2 (0.9 to 1.5)	1.2 (0.6 to 1.7)	1.2 (1.0 to 2.0)	1.3 (1.0 to 1.7)	1.1 (0.6 to 1.4)
2060	2.5 (1.8 to 2.9)	2.1 (1.3 to 3.3)	2.4 (1.2 to 3.2)	2.7 (2.0 to 3.1)	2.2 (1.6 to 2.8)
2090	3.8 (2.9 to 4.6)	3.5 (2.4 to 4.7)	3.9 (2.4 to 4.5)	4.2 (3.2 to 5.1)	3.6 (2.4 to 4.5)

Table 15: Mean monthly precipitation in Nairobi in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	64.1	56.5	92.8	219.4	175.5	35	17.5	23.5	28.3	55.3	154.2	101

Table 16: Projected precipitation change in Nairobi (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-2 to 12)	5 (-10 to 19)	1 (-18 to 22)	0 (-6 to 6)	12 (-13 to 23)
2060	7 (0 to 23)	8 (-2 to 37)	13 (-19 to 51)	0 (-7 to 7)	6 (-2 to 37)
2090	15 (0 to 41)	19 (-2 to 41)	16 (-22 to 72)	0 (-5 to 15)	28 (16 to 64)

APPENDIX

V) KISUMU

Table 17: Mean monthly high and low temperature in Kisumu in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	30	31	31	29	28	28	28	29	30	30	30	30
Average low °C	23.8	24.1	24.1	23.4	22.8	22.2	21.9	22.2	22.8	23.8	23.7	23.5

Table 18: Projected temperature change in Kisumu (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.3 (0.9 to 1.8)	1.2 (0.7 to 1.4)	1.2 (0.9 to 1.9)	1.4 (0.9 to 1.9)	1.2 (0.6 to 1.7)
2060	2.4 (1.8 to 3.1)	2.2 (1.4 to 3.2)	2.4 (1.5 to 3.0)	2.7 (2.0 to 3.3)	2.2 (1.8 to 3.1)
2090	3.8 (2.9 to 4.5)	3.4 (2.5 to 4.5)	3.8 (2.8 to 4.8)	4.3 (3.2 to 5.0)	3.5 (2.8 to 4.4)

Table 19: Mean monthly precipitation in Garissa in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	79	84	169	213	167	85	85	81	90	95	139	101

Table 20: Projected precipitation change in Kisumu (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-7 to 15)	4 (-27 to 22)	3 (-17 to 19)	-1 (-10 to 14)	7 (-23 to 33)
2060	10 (-6 to 36)	6 (-11 to 44)	12 (-20 to 69)	0 (-5 to 23)	17 (-3 to 48)
2090	17 (-7 to 58)	20 (-7 to 54)	21 (-30 to 93)	0 (-12 to 45)	34 (9 to 79)

VI) NAKURU

Table 21: Mean monthly high and low temperature in Nakuru in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	27	28	28	26	25	24	24	24	26	25	24	26
Average low °C	10	11	11	13	12	12	11	11	10	11	11	10

Table 22: Projected temperature change in Nakuru (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.2 (0.9 to 1.5)	1.2 (0.6 to 1.7)	1.2 (1.0 to 2.0)	1.3 (1.0 to 1.7)	1.1 (0.6 to 1.4)
2060	2.5 (1.8 to 2.9)	2.1 (1.3 to 3.3)	2.4 (1.2 to 3.2)	2.7 (2.0 to 3.1)	2.2 (1.6 to 2.8)
2090	3.8 (2.9 to 4.6)	3.5 (2.4 to 4.7)	3.9 (2.4 to 4.5)	4.2 (3.2 to 5.1)	3.6 (2.4 to 4.5)

Table 23: Mean monthly precipitation in Nakuru in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	29	45	69	141	130	79	92	105	89	70	70	44

Table 24: Projected precipitation change in Nakuru (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-2 to 12)	5 (-10 to 19)	1 (-18 to 22)	0 (-6 to 6)	12 (-13 to 23)
2060	7 (0 to 23)	8 (-2 to 37)	13 (-19 to 51)	0 (-7 to 7)	6 (-2 to 37)
2090	15 (0 to 41)	19 (-2 to 41)	16 (-22 to 72)	0 (-5 to 15)	28 (16 to 64)

VII) KERICHO

Table 25: Mean monthly high and low temperature in Kericho in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	30	31	31	29	28	28	28	29	30	30	30	30
Average low °C	17	18	18	18	18	17	16	17	18	18	18	17

Table 26: Projected temperature change in Kericho (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.3 (0.9 to 1.8)	1.2 (0.7 to 1.4)	1.2 (0.9 to 1.9)	1.4 (0.9 to 1.9)	1.2 (0.6 to 1.7)
2060	2.4 (1.8 to 3.1)	2.2 (1.4 to 3.2)	2.4 (1.5 to 3.0)	2.7 (2.0 to 3.3)	2.2 (1.8 to 3.1)
2090	3.8 (2.9 to 4.5)	3.4 (2.5 to 4.5)	3.8 (2.8 to 4.8)	4.3 (3.2 to 5.0)	3.5 (2.8 to 4.4)

Table 27: Mean monthly precipitation in Kericho in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	85.1	48.3	126.5	15.4	122.9	65.7	43.5	53.5	74.8	79	89.2	83.1

Table 28: Projected precipitation change in Kericho (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-7 to 15)	4 (-27 to 22)	3 (-17 to 19)	-1 (-10 to 14)	7 (-23 to 33)
2060	10 (-6 to 36)	6 (-11 to 44)	12 (-20 to 69)	0 (-5 to 23)	17 (-3 to 48)
2090	17 (-7 to 58)	20 (-7 to 54)	21 (-30 to 93)	0 (-12 to 45)	34 (9 to 79)

VIII) NYERI

Table 29: Mean monthly high and low temperature in Nyeri in 2009 (°C)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	25	27	26	24	23	21	20	20	23	24	23	24
Average low °C	11	10	12	14	14	13	12	12	12	13	13	12

Table 30: Projected temperature change in Nyeri (°C) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	1.2 (0.9 to 1.5)	1.2 (0.6 to 1.7)	1.2 (1.0 to 2.0)	1.3 (1.0 to 1.7)	1.1 (0.6 to 1.4)
2060	2.5 (1.8 to 2.9)	2.1 (1.3 to 3.3)	2.4 (1.2 to 3.2)	2.7 (2.0 to 3.1)	2.2 (1.6 to 2.8)
2090	3.8 (2.9 to 4.6)	3.5 (2.4 to 4.7)	3.9 (2.4 to 4.5)	4.2 (3.2 to 5.1)	3.6 (2.4 to 4.5)

Table 31: Mean monthly precipitation in Nyeri in 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation mm	40.6	27.7	54.5	136.2	142.4	22.5	22.4	22.5	21.8	70.8	96.3	68.8

Table 32: Projected precipitation change in Nyeri (mm) Mean (min-max)

	Annual	Jan/Feb	Mar/Apr/May	Jun/Jul/Aug/Sep	Oct/Nov/Dec
2030	3 (-2 to 12)	5 (-10 to 19)	1 (-18 to 22)	0 (-6 to 6)	12 (-13 to 23)
2060	7 (0 to 23)	8 (-2 to 37)	13 (-19 to 51)	0 (-7 to 7)	6 (-2 to 37)
2090	15 (0 to 41)	19 (-2 to 41)	16 (-22 to 72)	0 (-5 to 15)	28 (16 to 64)

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PAGE 1, child quote

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PAGE 3, paragraph 1

See UNDP climate summaries for more details: <http://country-profiles.geog.ox.ac.uk>

PAGE 3, paragraph 3

El Niño/La Niña Southern Oscillation (ENSO) is a climate pattern that occurs across the tropical Pacific Ocean on average every five years. ENSO brings floods, droughts and other climatic disturbances in many regions of the world. The severity of these disturbances these vary with each event.

PAGE 3, column 2, paragraph 2

The temperature for a 'hot day' (or night) is calculated by looking at temperatures that were 10 per cent higher than all days between 1970 and 1999. When compared with the start and end of the period, this can help to indicate the rate of climate change.

PAGE 3, column 2, paragraph 2

See www.adaptationlearning.net/climate-data/kenya-country-level-climate-data-summary

PAGE 4, column 1, paragraph 1

Using the mean from a series of models for a range of possible emissions scenarios (low to high growth). Projections developed by the School of Geography and the Environment at Oxford University for UNDP. For more details, see <http://country-profiles.geog.ox.ac.uk>

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PAGE 6, figures

For more detailed information on Mombasa's climate, see Appendix.

PAGE 7, child quote

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PAGE 7, paragraph 1

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For more detailed information on Garissa's climate, see Appendix.

PAGE 9, paragraph 3

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PAGE 10, figures

For more detailed information on Lodwar's climate, see Appendix.

PAGE 11, child quote

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PAGE 12, figures

For more detailed information on Nairobi's climate, see Appendix.

PAGE 13, child quote

10 Kenyan shillings = about 8p (June 2010). Bilharzia is a parasitic disease carried in water that can damage internal organs and impair growth in children.

PAGE 13, paragraph 3

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PAGE 14, figures

For more detailed information on Kisumu's climate, see Appendix.

PAGE 16, figures

For more detailed information on Nakuru's climate, see Appendix.

PAGE 17, column 1, last paragraph

Adaptation for Smallholders to Climate Change (AdapCC), a public-private partnership between the British Fairtrade company Cafédirect and the *Deutsche Gesellschaft für Technische Zusammenarbeit* (GTZ), see www.adapcc.org

PAGE 18, figures

For more detailed information on Kericho's climate, see Appendix.

PAGE 19, paragraph 3

Adaptation for Smallholders to Climate Change, 2009 study.

PAGE 20, figures

For more detailed information on Nyeri's climate, see Appendix.

ACRONYMS

AdapCC
GTZ

Adaptation for Smallholders to Climate Change
Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)

ENSO
IPCC

El Niño Southern Oscillation
Intergovernmental Panel on Climate Change

ITCZ
UNDP

Inter-Tropical Convergence Zone
United Nations Development Programme

UNICEF

United Nations Children's Fund

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