

**Briefing on the Horn of Africa Drought: Climate change and future impacts on food security**

East Africa is facing the worst food crisis of the 21st Century. Across Ethiopia, Somalia, and Kenya, 12 million people are in dire need of food, clean water, and basic sanitation. Loss of life on a massive scale is a very real risk, and the crisis is set to worsen over the coming months, particularly for pastoralist communities.

It is no coincidence that the worst affected areas are those suffering from entrenched poverty due to marginalisation, conflict and lack of investment. While severe drought has undoubtedly led to the huge scale of the disaster, this crisis has been caused by people and policies, as much as by weather patterns. An adequate response to the current crisis must not only meet urgent humanitarian needs, but also address these underlying problems.

**Overview**

**Beyond the debate on climate change's role in the current crisis in East Africa, one thing is clear. If nothing is done, climate change will in future make a bad situation worse. Urgent action is required at global and local levels if today's food crisis is not to be a grim foretaste of future hunger and suffering.**

Whether the drought in the Horn of Africa was made more likely by man-made climate change is as yet unclear due to the complexity of the local climate, but it shows the vulnerability of poor people in the region to climate variability. An adequate response to the current crisis must address the existing vulnerabilities of those worst hit – often due to under-investment and marginalisation – in the context of anticipated future changes to the climate.

Over the coming decades, unless urgent action is taken to slash greenhouse gas emissions, temperatures in the region will continue to rise and rainfall patterns will change. This will create major problems for food production and availability – one recent estimate published by The Royal Society suggests much of East Africa could suffer a decline in the length of the growing period for key crops of up to 20 per cent by the end of the century, with the productivity of beans falling by nearly 50 per cent.

This prospect must spur major action. Only action now to cut greenhouse gas emissions can avert such catastrophic levels of global warming by the end of the century. The current pledges of emission reductions made by governments must be increased. Developed countries must lead by raising their current targets to at least 40 per cent below 1990 levels by 2020, and start to mobilise the \$100 billion per year committed for climate action in developing countries.

National governments and the international community should target immediate and adequate resources at building the resilience and boosting the productivity of pastoralists and smallholder food producers in the Horn of Africa. These efforts must focus on increased long-term investment in livelihood support, disaster risk reduction, and climate change adaptation.

## 1. Introduction

This briefing explores the links between the 2010/2011 drought in the Horn of Africa and recent climate trends, and how climate change might impact on food security in the region in the future.<sup>1</sup> It should be noted that whilst the current *drought* has been caused by lack of rainfall, the *disaster* is man-made. Many of the worst affected areas are also some of the poorest, least developed and most neglected parts of the region; decades of marginalisation of and under-investment in the people living there have contributed significantly to the current crisis.

Unchecked climate change will exacerbate the challenges they face. An adequate response to the current crisis must not only meet urgent humanitarian needs, but also address these underlying problems in the face of a changing climate to ensure the food security of the region's people in the years and decades to come.

## 2. The current crisis

The current drought conditions have been caused by successive seasons with very low rainfall. Over the past year, the eastern Horn of Africa has experienced two consecutive rainy seasons which were severely below average. In some areas of Kenya, drought conditions have persisted for even longer. Analysis of rainfall in pastoral areas in Ethiopia and Kenya has revealed that rainfall over the past year was below average in all analysis areas, with 2010/11 being the driest or second driest year since 1950/51 in 11 of the 15 analyzed pastoral zones.<sup>2</sup>

According to the UK Met Office,<sup>3</sup> the low rainfall in the short rains (Sept-December 2010) may be attributed in part to so-called La Niña conditions, though rainfall patterns during the long rains (March-June) are less clearly linked with the El Niño Southern Oscillation (ENSO)<sup>4</sup>.

## 3. Is this drought part of a trend? Is this climate change?

The climate in the region is changing, although not all relevant trends are clear.

*According to surveys of local communities*, the climate in the Horn is experiencing an increase in the rates of drought. Reports from the Kenya Food Security Group and from pastoralist communities show that drought-related shocks used to occur every ten years, and they are now occurring every five years or less.<sup>5</sup> Borana communities in Ethiopia report that whereas droughts were recorded every 6-8 years in the past, they now occur every 1-2 years.<sup>6</sup>

*According to meteorological data:*

- **Temperatures have increased:**<sup>7</sup> Mean annual temperatures increased from 1960-2006 by 1.0°C in Kenya and 1.3°C in Ethiopia, and the frequency of hot days is increasing in both countries.
- **Rainfall trends are less clear:** According to the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC AR4), there are no statistically significant trends in rainfall. However, more recent research suggests that rainfall decreased from 1980 to 2009 during the 'long-rains' (March to June).<sup>8</sup>

Globally, climate change is projected to increase the frequency and severity of extreme weather events like droughts and floods. There are so far only a few cases in which scientists have been able to estimate the extent to which man-made climate change has made a particular extreme weather event more likely, and no such studies as yet exist in the case of the current drought in the Horn of Africa.<sup>9</sup> The experience of communities however indicates clearly their vulnerability to changes in the climate, and highlights the importance of accurate future climate projections for their livelihoods and food security.

#### 4. Impacts of climate change in the future

It is important to note that climate change impacts will vary across different locations and at different times into the future, as soil types, topography and other factors vary across the region. We can expect, therefore, an assortment of climate change effects.<sup>10</sup>

All climate models reflect an inevitable level of uncertainty, but currently we can say that, in the absence of urgent action to slash global greenhouse gas emissions, **temperatures will continue to rise**. Temperatures in the region will likely increase by 3°C-4°C by 2080-2099 relative to 1980-1999.<sup>11</sup>

**Rainfall trends, on the other hand, are unclear.** Most projections, including those of the IPCC, suggest more rain will fall in the East Africa region as a whole,<sup>12</sup> and particularly during the short rains (October to December) in Southern Ethiopia and across Kenya,<sup>13</sup> with an increase in rain falling in 'heavy events' (sudden downpours).<sup>14</sup> However, some recent studies suggest rainfall will decrease, particularly in the long rains (March to June).<sup>15</sup> Even if rainfall does increase, this will in part be offset by temperature rises which cause greater evapotranspiration, and more rain falling in heavy events will result in increased surface runoff and flooding.

A further uncertainty in climate projections is related to ENSO which, as stated above, has a strong influence on the Horn of Africa's seasonal rainfall. Climate change models show wide disagreements in projected changes in the amplitude of these events in the future and thus currently there is no agreed link between ENSO and climate change. These uncertainties in the projections around rainfall mean that projections about the future incidence of drought in the Horn due to climate change are currently very difficult.

#### 5. What will climate change mean for food security in the region?

Although it is unclear whether climate change will mean an increase in the frequency or severity of droughts in the region in the future, it is clear that climate change will have a major impact on the food security and livelihoods of people living there because of long-term shifts in temperature and precipitation.

According to one recent study published by The Royal Society, based on multiple model simulations, in a world which warms by more than 4°C, changes in temperature and precipitation in the region could mean:

- **Crop growing period:** Decline in length of growing period for crops by up to 20 per cent by 2090 for much of the region (although some patches of East Africa may experience very moderate increases);
- **Maize:** Decline of yields by nearly 20 per cent compared to today;
- **Beans:** Decline in yields by nearly 50 per cent compared to today.<sup>16</sup>

These findings cover the entire East Africa region (Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania and Uganda) and come with inevitable uncertainties associated with localised impacts. They nonetheless show that even with moderate increases in the length of crop growing period in some patches of the region, agricultural productivity could decline dramatically due to climate change in the decades ahead as temperatures increase and rain patterns change. On top of these projections, any incidence of extreme weather events like droughts will further hit food production in the region.

These reductions in food production will have severe consequences most directly for smallholder farmers and agro-pastoralists, who rely on farming for income, and for all those who purchase such crops.

The direct impact of climate change on pastoralism is not well established – this is still an emerging area of research. There will likely be impacts on:

- **Pasture quality and quantity:** Yields of fodder (grass cultivated for feeding cattle) may increase moderately (perhaps by 9 per cent),<sup>17</sup> but models also project decreases in grasslands due to increases in tropical woody vegetation which could reduce options for accessing dry season feeding resources.<sup>18</sup>
- **Heat stress:** higher temperatures will cause an added burden for livestock which may impact on milk and meat production.
- **Disease:** certain pathologies may be reduced by heat and drought, such as Trypanosomiasis and worms; however, the same circumstances will lead to congregation of animals around water holes, increasing transmission of diseases.<sup>19</sup> Increased rainfall could increase disease; for example, Rift Valley Fever usually increases in the wet season.<sup>20</sup>

## 6. Oxfam recommends

The current experience of communities is that seasons are changing and drought frequency is increasing. And for the future, whilst there is still uncertainty concerning the exact impact of climate change in this region, it is clear that temperatures will continue to increase and rainfall patterns change. This will have significant impacts on food security – probably reducing production across the board – for major food producers, small holder farmers and pastoralists.

### To avoid catastrophic levels of global warming:

Urgent action is needed now by all governments to slash greenhouse gas emissions, if devastating levels of warming this century are to be averted.

- The total current pledges of emissions cuts are inadequate, all governments must increase their efforts to keep the chance of limiting global temperature rises to 1.5°C within reach.
- Developed countries must lead by increasing their current targets to cut emissions to more than 40 per cent below 1990 levels by 2020, and start to mobilise the \$100 billion per year they have committed for climate action in developing countries.

### To improve food security and strengthen climate resilience:

Even if action to cut global emissions is forthcoming, the inertial impact of greenhouse gases in the atmosphere is such that East Africa faces decades of disruptive climate change. National governments and the international community should dramatically increase long-term investment towards building the resilience and boosting the productivity of pastoralists and smallholder food producers in the Horn of Africa. These efforts must focus on:

- *disaster risk reduction*, to adapt both development and humanitarian strategies to ensure that they both reduce the risk of future disasters. Drought cycle management offers a useful approach – where appropriate and different responses are developed for different elements of the drought cycle – which needs to be more effectively and consistently implemented by governments in the region. Donors must provide long-term flexible funding which can ‘change gear’ as conditions change.
- *climate change adaptation*, to build the capacity of vulnerable people to thrive in spite of changes to the climate affecting their livelihoods. Better information about how a changing climate will affect farmers and pastoralists at the household level is needed, and in a form which is useful to them. This must start with new investment in data collection for weather, land-use, crops and livestock, to better understand the adaptive strategies that may be available.
- *long-term investment in livelihood protection measures and smallholder food production*, to start to reverse the economic and developmental marginalisation in affected areas. The kinds of practices that policies and longer-term investment should encourage include drought cycle management, investment in dry lands and pastoral communities most affected, improved access to markets, support to women and provision of financial services including savings, credit and insurance.

## NOTES

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<sup>1</sup> Note that this brief looks primarily at Ethiopia and Kenya – whilst Somalia is also seriously affected, there is very little data to draw on.

<sup>2</sup> FEWS NET. East Africa: Past year one of the driest on record in the eastern Horn, June 14, 2011

[http://www.fews.net/docs/Publications/FEWS%20NET%20EA\\_Historical%20drought%20context\\_061411.pdf](http://www.fews.net/docs/Publications/FEWS%20NET%20EA_Historical%20drought%20context_061411.pdf)

<sup>3</sup> Met Office (2011). Drought in the Horn of Africa: Climate Update Brief. Produced for UK Emergency Response NGOs. 15 July 2011

<sup>4</sup> ENSO is a shift in winds and ocean currents, centered in the South Pacific region, with worldwide consequences for climate and biological systems. ENSO conditions can be El Niño, La Niña or ENSO-neutral.

<sup>5</sup> Oxfam (2008) 'Survival of the Fittest: Pastoralism and climate change in East Africa,'

<http://www.oxfam.org/sites/www.oxfam.org/files/bp116-pastoralism-climate-change-eafrica-0808.pdf>

<sup>6</sup> SCF, CARE, IISD, IUCN (2009). 'Climate-related vulnerability and adaptive-capacity in Ethiopia's Borana and Somali communities,'

<http://www.elmt->

[relpa.org/FCKeditor/UserFiles/File/elmt/201003/Climate%20Change%20study.%20Full%20Assessment%20Report\\_FINAL.pdf](relpa.org/FCKeditor/UserFiles/File/elmt/201003/Climate%20Change%20study.%20Full%20Assessment%20Report_FINAL.pdf).

<sup>7</sup> This is taken from UNDP Climate Change Country Profiles of Ethiopia and Kenya, and is based on IPCC data

[http://country-profiles.geog.ox.ac.uk/UNDP\\_reports/Ethiopia/Ethiopia\\_low\\_res\\_report.pdf](http://country-profiles.geog.ox.ac.uk/UNDP_reports/Ethiopia/Ethiopia_low_res_report.pdf)

[http://country-profiles.geog.ox.ac.uk/UNDP\\_reports/Kenya/Kenya\\_low\\_res\\_report.pdf](http://country-profiles.geog.ox.ac.uk/UNDP_reports/Kenya/Kenya_low_res_report.pdf)

<sup>8</sup> Williams and Funk (2011) 'A westward extension of the warm pool leads to a westward extension of the Walker circulation, drying eastern Africa,' J. Climate Dynamics online. <http://sd-cite.iisd.org/cgi-bin/koha/opac-detail.pl?biblionumber=50611>

<sup>9</sup> For example, Pall, P. *et al.* (2011) 'Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000,' Nature,

470 <http://www.nature.com/nature/journal/v470/n7334/full/nature09762.html#author-information>

<sup>10</sup> Overseas Development Institute (2009) 'Pastoralism and Climate Change: Enabling adaptive capacity,' p 2

<http://www.odi.org.uk/resources/download/3304.pdf>

<sup>11</sup> IPCC (2007) 'Fourth Assessment Report: The Physical Science Basis,' Chapter 11, p 868 [http://www.ipcc.ch/pdf/assessment-](http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter11.pdf)

<report/ar4/wg1/ar4-wg1-chapter11.pdf>

<sup>12</sup> *Ibid.* p 869

<sup>13</sup> UNDP Climate Change Country Profiles *op cit.*

<sup>14</sup> Royal Netherlands Meteorological Institute (2007) 'Climate Change in Africa,' [http://www.knmi.nl/africa\\_scenarios/East\\_Africa/](http://www.knmi.nl/africa_scenarios/East_Africa/); IPCC (2007) *op. cit.* p 871 (perhaps a 20 per cent increase in extremely wet seasons)

<sup>15</sup> Williams and Funk (2010), 'A westward extension of the tropical Pacific warm pool leads to March through June drying in Kenya and

Ethiopia,' U.S. Geological Survey Open-File Report 2010–1199 <http://pubs.usgs.gov/of/2010/1199/pdf/ofr2010-1199.pdf>

<sup>16</sup> Thornton, P. *et al.* (2011) 'Agriculture and Food Systems in Africa in a +4C World,' in Phil. Trans. R. Soc. 369, pp 117-136,

<http://rsta.royalsocietypublishing.org/content/369/1934/117.full.pdf+html>

<sup>17</sup> Thornton (2011) *Op. cit.*

<sup>18</sup> Doherty *et al* (2009) 'Implications of future climate and atmospheric CO2 content for regional biogeochemistry, biogeography and ecosystem services across East Africa,' Global Change Biology. j.1365-2486.2009.01997.x

<sup>19</sup> Convention on Biological Diversity Subsidiary Body on Scientific Technical and Technological Advice (2010) 'Compilation of Experiences in the field of climate change mitigation and adaptation, soil management and pastoralism in drylands/sub-humid lands,' UNEP/CBD/SBSTTA/14/INF/35

Ole-Neselle, M.B (2009) 'Climate Change and pastoralism in Manyara, Tanzania: study to understand the reality of climate change'.

<sup>20</sup> Oxfam (2008) 'Survival of the Fittest: Pastoralism and climate change in East Africa,' pp 13-14

<http://www.oxfam.org/sites/www.oxfam.org/files/bp116-pastoralism-climate-change-eafrica-0808.pdf>