

# Climate Change in Kenya:

PROJECTIONS, IMPACTS  
AND WAY FORWARD



**Save the Children**



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December 5, 2012

Front cover photo: Colin Crowley/Save the Children

# Key Messages

## Message 1: If you think things are difficult now, the worst has only just begun

- Mean surface temperature will increase. This will make the land surface drier and will increase the land cover of arid and semi-arid lands. It will also increase stress on water quality and quantity. Vegetation will decrease due to drier surface, water stress, and loss of nutrients. This will cause even greater food insecurity due to crop failure and livestock death.
- Both the long and short rainy seasons are expected to become wetter, more severe, and frequent. This will cause more regular and severe floods which will greatly affect human health (more malaria, dengue, cholera outbreaks etc.), increase livestock disease, and damage crops and infrastructure.
- Droughts are expected to occur with the same frequency however more severe. Increased droughts with the magnitude of the 2011 drought will be catastrophic. It will impact crop cycles, increase water insecurity, stress on livestock, and increase food insecurity to a new level where communities may not be able to cope regardless of humanitarian aid.

## Message 2: How will climate change impact Save the Children?

More floods or droughts will have an enormous impact on Save the Children's work. Current interventions will become harder to implement. Food insecurity will increase as agricultural yields and livestock decrease. This will affect the FSL sector. Additionally, lack of access to food will increase malnutrition among children. Increased water stress means more water insecurity, which will affect the WASH sector. Increased conflicts over water and other resources will affect child protection. It is clear that these impacts will distract progress on long term development plans and investments (as these adjust with short term humanitarian needs) and will also keep Save the Children stuck on a reactive humanitarian response cycle. If Save the Children is serious about improving nutritious diets and promote resilient livelihoods over the long term, it will have to consider the impacts of climate change into project development now.

## Message 3: What can Save the Children do?

The reality is that many agencies are stuck in preparedness-response cycles. Long term development is interrupted every time the region experiences a disaster. Since the drought-flood cycle will only get worse, current projects will not have time to recover and move forward. Working within this cycle makes the goal of resilience building impossible.

We have development pathways options. Essentially, the choices Save the Children makes today regarding the development pathway we decide to follow will determine the degree we allow climate change to affect long term development goals. This is divided into three future development pathways:

1. "Climate ignorant development"- does not acknowledge/consider climate change projections and bares the greater costs (human and financial) of climate change in the future.
2. "Climate adjustment development" - acknowledges climate change projections but does not integrate this into development planning until shocks are felt.
3. "Climate proofed development" - acknowledges and considers climate change projections into current development designs, reducing future impacts of climate change on development interventions.



Photo: Tugela Ridley/Save the Children



Photo: Philip Crabtree/Save the Children

## Message 4: Save the Children must opt for climate proofed development to achieve its goals

Climate proofed development for Save the Children requires the following actions and understanding:

- Investing time in understanding how these projections will affect our projects (also called, climate proofing our projects). It requires designing activities that will have a longer term impact on the areas and secure the children's future wellbeing. Invest time in research/assessments so as to understand the current and future context of the region (socio-economic, environmental, and climatic) and how these affect our scope of work (at the community and sectoral level)
- Align interventions and research assessments with existing government development plans and budget cycles
- Building resilience is a process not an end goal. Successful results from short term projects are not realistic when addressing long term impacts and objectives related to climate change and resilience building. Therefore, capacity building across all sectors is essential. Communities must be informed, aware, and involved in planning interventions as they prepare for future impacts. Their capacities must be enhanced and supported by existing governance structures.
- Lastly, the focus should not merely focus on what is being done rather than how it is being done. Save the Children is already addressing issues that will be impacted by future trends. However, the efficiency of the way these interventions are being addressed must be reassessed. If this is addressed through an innovative approach looking at current and future trends, we may just get on the right path towards building resilient communities.

# Introduction

“In Africa adaptation is not an option but a necessity”, the Fourth Assessment Report (AR4) identified Africa as “one of the most vulnerable continents to climate change and climate variability” (Boko et al , 2007). Climate change (CC) poses an ongoing threat to development in Arid and Semi-Arid Lands (ASALS) in the Horn of Africa (HoA) (IPCC, 2012). Non-Governmental Organizations (NGOs) have been implementing development interventions in the region for many decades. The effectiveness and sustainability of such interventions are questionable as Africa is still lagging behind other regions of the world in achieving the Millennium Development Goals (MDGs) (United Nations, 2011). This calls for a shift in current development strategies. Increased vulnerability in the region has acquired increased attention to climate change as one of the many obstacles for achieving sustainable development and increasing resilience in the ASALS. This has given rise to a new era for development agencies as they are now attempting to build resilience through mainstreaming Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA). This brief will focus specifically on the significance of mainstreaming CCA into development interventions.

## Some key findings relevant to Kenya

In 2007 the Intergovernmental Panel on Climate Change (IPCC) - released the Fourth Assessment Report. This section highlights some key statements and findings relevant to the Horn of Africa.

- There is high agreement and evidence that Greenhouse Gas (GHG) emissions will continue to increase over the coming decades.
- A warming of about 0.2°C per decade is projected over the next two decades

## Impacts for Africa

- By 2020, between 75 and 250 million of people are projected to be exposed to increased water stress due to climate change<sup>I</sup>.
- By 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50%.
- Agricultural production, including access to food, in many African countries is projected to be severely compromised. This would further adversely affect food security and exacerbate malnutrition.<sup>II</sup>
- Towards the end of the 21st century, projected sea level rise will affect low-lying coastal areas with large populations. The cost of adaptation could amount to at least 5 to 10% of GDP<sup>III</sup>.
- By 2080, an increase of 5 to 8% of arid and semi-arid land in Africa is projected under a range of climate scenarios.<sup>IV</sup>

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I {WGII 9.4, SPM}

II {WGII 9.4, SPM}

III {WGII 9.4, SPM}

IV high confidence {WGII Box TS.6, 9.4.4}



Photo: Tugela Ridley/Save the Children

## Observed climate change in North Eastern Kenya

- In 2012, LTS conducted a study with communities in Wajir to support the design of the Signature Program in NE Kenya. One component of this study focused on climate change. This section discusses the results of community consultations regarding climate change observations and perceptions conducted by Irene Karani (LTS).
- The study found that drought used to recur in Wajir in 8 and 50 year cycles. Elders have no longer been able to predict these cycles as these have altered. According to communities in Wajir, **the frequency of drought periods has increased to every 2 years making it difficult for communities to recover before the next drought strikes.**
- Results from consultations indicate that there used to be two rainy seasons long rains (Gu) from March - May and the short rains (Dehyr), from October - December. June-July used to be the cold dry season. This is no longer the case since the sequence has changed from the early 90s. Communities have observed **a reduction in precipitation of 2 weeks during the long rainy season. Conversely, the short rainy season has increased to January.** In addition, the temperatures in the cool dry season have increased. **Temperatures in the hot season are said to have increased from between 32°C/33°C to 37°C-40°C.** Due to the shift in rainy seasons, pockets where crop production used to take place have been affected i.e. in Buna people who used to cultivate crops like maize and sorghum for more than 15 years were unable to harvest any crop (LTS, 2012).

## Climate change projections

Several studies regarding climate change projections for Kenya and Wajir (ICPAC and SEI, 2009) displayed a general agreement on temperature increase and precipitation patterns. Climate projections for Africa for increasing temperatures have been consistent, whereas precipitation changes have been harder to project (Boko et al, 2007). General climate projections are as follows:

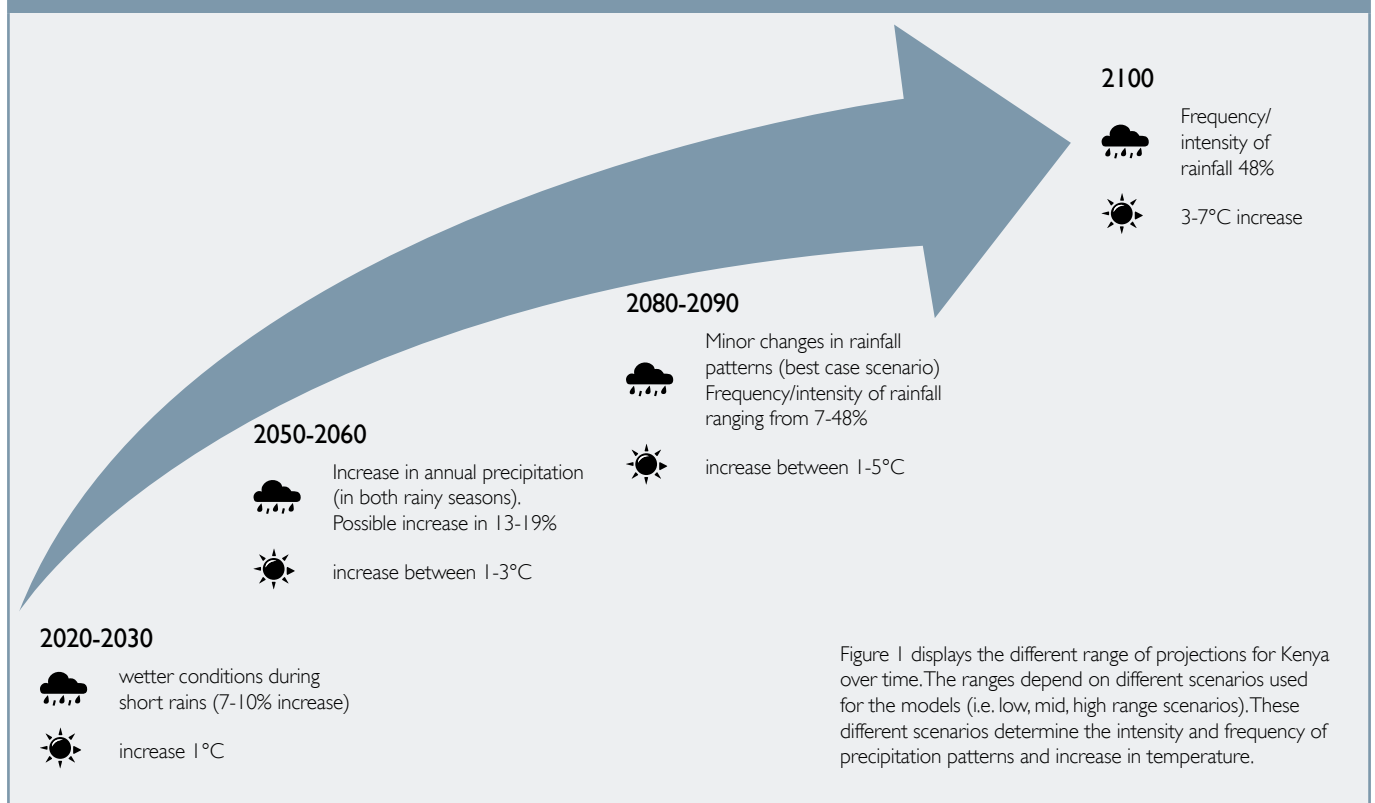
- There is high agreement that mean temperature will rise between 1°C and 5°C by 2100. A 1°C increase is likely to happen by 2020s and an increase in 4°C or more by 2100 (see figure 3 for details on projected trends over time)
- Both the long and short rainy seasons are expected to become wetter, more severe, and frequent. Increased rainfall is expected specifically during the short rains (October – December) with a possible increase of 40% by 2100
- Rainfall seasonality is expected to remain unchanged meaning that they will still occur within the same months as present. However, the distribution may be different. For example, average rainfall may increase but will fall under shorter periods of time (i.e. 3 days instead of over 2 months).
- Some models suggest that droughts are expected to occur with the same frequency, however more severe

Generally, global warming will likely result in an increase in extreme droughts and flood events over the coming decades. **An increase in mean temperature will enhance evapotranspiration which will affect the availability of water resources regardless of possible increased rainfall** (ICPAC and SEI, 2009). Increased evaporation rates along with other factors (i.e. environmental degradation, population growth, politics, and more sporadic rainfall) all contribute to the severity of a drought.

Recent trends show coherence with projections for the region. According to a report by the Met Office UK frequency of strong rainfall events causing floods has increased in East Africa over time with “an average of less than 3 events per year in the 1980s to over 7 events per year in the 1990s and 10 events per year from 2000 to 2006, with a particular increase in floods” (Met Office UK, 2011).

# Climate change projections for Kenya

FIGURE I



## Potential climate change impacts

Climate change projections for Kenya pose severe threats to the environmental and socio-economic sectors of the ASALS. Hazards such as floods and droughts are likely to increase in frequency and/or severity. Consequently, this will have an impact on different sectors for Save the Children for example WASH, FSL, and child protection to name a few. Addressing future climate change impacts will be critical for Save the Children provided that climate change impacts will likely aggravate current development challenges. Additionally, some sectors may face impacts which will be a novelty in a given community (i.e. flooding). Table I illustrates some potential impacts related to climate projections described above.



POTENTIAL CLIMATE CHANGE IMPACTS FOR KENYA (ASALS)						
Climate Change	Hazards	Impacts by sector				
		Social			Environmental	Economic
		Livelihood	Health	Water		
Increase in temperature	Increase in severity of droughts & heat stress	Crop failure specifically for rain-fed agriculture	Increase in malaria and dengue fever incidence	Increased water stress due to decrease in groundwater as a result of a rise in evaporation and decrease in water infiltration	Increase in ASALS/ desertification Saline intrusion	Decrease in GDP with loss of agricultural yields and livestock deaths
		Food insecurity/ famine	Malnutrition		Increased soil erosion/ degradation	
		Increase in Pastoral dropouts	Increased risk for rift valley fever		Loss of vegetation cover/decrease in ASALS carrying capacity	Increased dependency on foreign aid due to complex emergencies
Increase in precipitation	Increase frequency and severity of floods	Decrease in livestock due to increase in diseases	Increase in vector and water borne diseases	Decrease in water quality	Sedimentation	Damage to infrastructure. Difficult access to basic services
		Loss of crops and livestock	Rise in cholera outbreaks, dysentery etc.		Erosion and loss of nutrients of topsoil	
		Interruption of schooling, long term impact on education in the region	Increase in malaria and dengue fever incidence		Loss of habitat	Impact on agriculture and livestock sector

## The case for climate change adaptation

Pastoralists in Wajir have for centuries survived and adapted to the harsh environment of ASALS of Kenya. This way of life is now being threatened by a combination of socio-economic, environmental challenges in addition to climate change. **Wajir will face numerous challenges under a changing climate where hazards such droughts and floods will increasingly affect the population in terms of frequency and severity.** Impacts will be felt at the individual, local, regional and national levels in sectors.

Climate change adaptation is a new field of study and an ongoing process. Monitoring and evaluating methods are still being researched hence, it is impossible to state if any measure will be 100% successful. Nonetheless, it is critical to attempt to promote ideas that will benefit the current generation and refine these measures so that future generations can also live in Wajir in a safe environment.

## Types of adaptation

Generally, climate change adaptation can be divided into two categories :

### 1. Proactive

Within the proactive category, adaptation strategies may be planned (i.e. policy) or anticipatory (before climate change impacts strike). The proactive adaptation strategies involve acknowledging climate change and using projections as a form to prepare for possible impacts.

### 2. Reactive

Within the reactive adaptation two components: spontaneous and adjusted adaptation. Reactive adaptation on the other hand, handles climate change impacts once they have happened. Reactive adaptation is inevitable as the magnitude of climate change is uncertain. Therefore, adaptation will also be a process of learning from experience.

Additionally, adaptation measures can be further divided into the following:

- **Ecosystem-based Adaptation (EbA):** Increases ecological resilience through enhancing ecosystems
- **Structural:** Uses engineering solutions for infrastructure to protect from CC impacts
- **Institutional:** Regulatory measures including policy-making and capacity building that target CC solutions

#### EXAMPLE OF ADAPTATION: IMPROVED MANAGEMENT AND DIVERSIFICATION OF LIVESTOCK

Diversifying livestock is not only a viable but also logical adaptation measure. Switching from cattle to camel for instance is beneficial for both pastoralists and grassland ecosystems. In contrast to cattle, camels feed off of leaves from shrubs and trees which alleviate pressure on grass. Furthermore, camels are more drought tolerant as they can go more days without water and hence cover longer distances to graze (Lier; 2010). The Food and Agriculture Organization (FAO) has promoted livestock management training to communities in ASALS. Simple actions as switching from having livestock grazing further away from villages during rainy seasons and closer to villages during droughts have also reduced vulnerability during droughts (FAO, 2012). Implementation is feasible and can be replicated in Wajir.

## No regret solutions

Climate change impacts are inevitable. Undoubtedly, uncertainties exist when developing climate projections. This is due to the fact that future demographic, economic, and environmental trends are uncertain. However, this should not detain development interventions from seeking “no-regret” solutions by mainstreaming risk reduction and adaptation strategies.

## Global Thresholds & Tipping points

Globally, we are still tracking under a worst case scenario, meaning that mean global temperatures could reach up to 6-7 degrees Celsius by the end of the century. Scientists have predicted that mean global temperature must not surpass a 2 degrees Celsius threshold in order to avoid irreversible damage to our ecosystems which we ultimately rely on for survival.

As discussed in the observed climatic trends from communities in NE Kenya, climate change is not an abstract idea far into the distant future. It is already taking place and it is quite clear that the trends are already under way when you compare these observations with the projections listed above. Communities in NE Kenya are facing increasing vulnerability as their livelihoods are threatened due to climatic variability. Climate change impacts as shown on table 1 will exacerbate existing development challenges that the international community has not been able to handle provided the current climatic context

## Opportunities

There is a window of opportunity to build resilience and change the way development interventions is done as climate change is not a matter of "if" but "when". So the question is not only whether organizations are innovative enough to think outside the existing failing systems (Levine, 2011) but whether they are also willing to take risks and work with uncertainty. This change starts with project proposals and a donor community that has an understanding of these implications promote flexibility in planning and monitoring. The bottom line is not on whether institutions "believe" in climate change or not, but rather these are willing to become risk takers or risk makers.

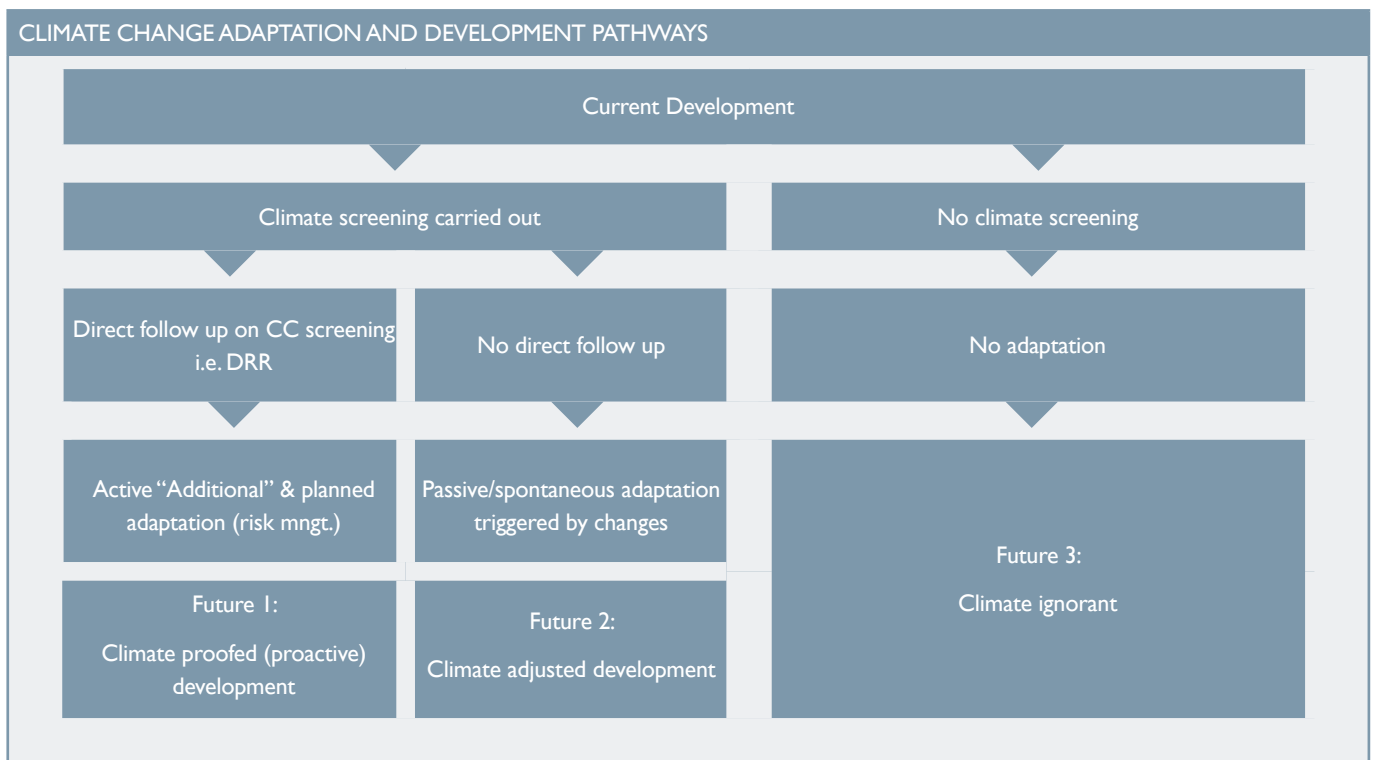
## Recommendations and the way forward for Save the Children

Development agencies are at a cross road in a critical moment in history where they have the choice to be proactive and address future impacts and uncertainties now or be reactive and incur the costs of climate change impacts as they come in a not too distant future. Figure 4 describes the possible pathways Save the Children may choose to address climate change. The success of future development interventions and resilience building will ultimately depend on the choices we make today. Are we selecting a pathway that is flexible enough to deal with the uncertainties of climate change or are we willing to take a risk and continue with development as usual and hope for the best?

Provided with the trends from this brief, the recommendation for Save the Children is to promote development interventions in the region using a precautionary approach to climate change. This is the only responsible and ethical choice for an organization that is working specifically towards saving children who are the future generation.

Mainstreaming climate change adaptation does not necessarily incur an increased financial burden on different sectors. It does however involve forward thinking and a shift in approach in terms of going beyond accepting what we are implementing and focusing more on how we are implementing projects. This will require the following:

- Establishing a culture of prevention and mainstreaming DRR/CCA
- Taking an integrated management approach and understanding the current and future context of the region (socio-economic, environmental, and climatic)
- To ensure sustainability of any intervention, these must be aligned with governments and existing plans
- Advocate for longer term funding in project proposals where building resilience is identified as an overall objective



# Appendix I:

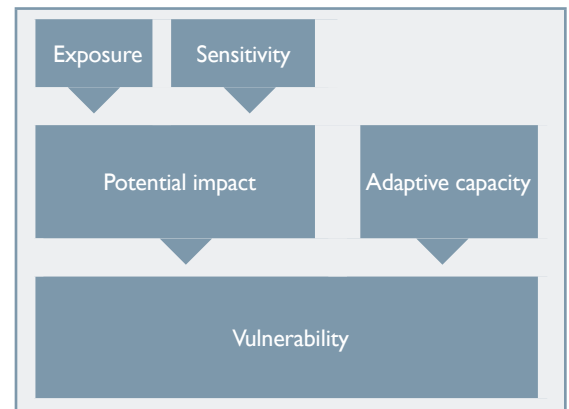
## How do we get Climate Change Projections?

### Climate change projections, modelling and a reason for concern

Integrating CCA into development schemes requires familiarity with possible future climatic projections under different scenarios (listed under Intergovernmental Panel on Climate Change Special Report on Emissions Scenarios). Global Climate Models (GCM) such as CSIRO and HAD300 (among several others) are useful in understanding future climate trends (ICPAC and SEI, 2009). However, climate modelling is only one component of this process. Mainstreaming CCA also requires assessing current and future impacts plus vulnerability of target areas based on climate change projections. Vulnerability is “a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC, 2000). Yet impacts and vulnerability trends should not be limited to risks related to climatic variability. Socio-economic and environmental tendencies (i.e. environmental degradation, armed conflict etc.) should also be deliberated. Once these components have been identified, adaptation strategies should be formulated.

It is essential to recognize the limitations of climate change models as they do not offer 100% accurate projections. This is due to the complexities and uncertainties of future trends of demographic growth, economic pathways, and technology to name a few. GCMs offer a simplified global representation of global climate systems, hence downscaling projections to regional and local levels remains a difficult task. It must be noted that the projections listed on this brief do not cover all scenarios outlined by the scientific community, also referred to as SRES. The AIFI scenario (fossil fuel intensive) for example, has not been tested for this particular region in depth. This is important to consider provided that at a global scale, society finds itself presently tracking at an AIFI range scenario (business as usual) since the global economy remains heavily reliant on fossil fuels (see figure 2).

In other words, globally we have not managed to significantly cut back on Greenhouse Gas (GHG) emissions (responsible for global warming). Moreover, the Intergovernmental Panel on Climate Change (IPCC) determined there is high agreement and evidence that GHG emissions will continue to increase over coming decades (IPCC, 2007). The IPCC has determined that global GHG emissions must be reduced by 25- 40% below 1990 levels by 2020 in order to avoid “dangerous climate change” (an increase of 2° C). International treaties have failed to agree and implement emission reduction targets identified by the IPCC. Since the Kyoto protocol's first round of commitments expires at the end of 2012, the future remains gloomy. We are on a race against time to curb GHG emissions if we are to avoid the worst impacts of climate change. The fact that we are tracking under a BAU scenario and that projections have been made under more optimistic scenarios, make the climate model projections conservative and this must be considered in assessing impacts and adaptation policies across all sectors.



# Appendix 2:

## How do we get Climate Change Projections?

### GLOBAL WATER INITIATIVE/CARE - GARISSA - 2009

Project activities identified for the CARE Kenya projects in Garissa were screened to assess their impact on livelihood resources influenced by climate related hazards and important to implementing sustainable coping strategies. The level of impact was rated as positive, negative or neutral and could be both positive and negative. Project activities were revised in order to strengthen positive impacts from current project activities, minimize negative impacts and make positive impacts that are currently neutral. These revised project activities were then screened to determine whether they were sustainable with the impacts of climate change. Examples are below:

Original Project Activities	Revised project activities	Revised Project Activities to reduce climate change impacts
Construction of low cost household latrines	Construction of low cost latrines away from water sources; encourage further construction of additional latrines, also replant trees to replace those used.	Construction of improved pit latrines such as pour flush latrines
Desiltation and ancillary works of the earthpan	Desiltation and ancillary works of earthpan, including planting of vegetation cover around the pan	Construct an infiltration well and pump water into the cattle troughs and washing area to minimise movement inside the water pan enclosure. Reinforce the fence using thorns to prevent wild animals from entering the water pan area
Desiltation and ancillary works of the earthpan	Desiltation and ancillary works of earthpan, including planting of vegetation cover around the pan	Construct an infiltration well and pump water into the cattle troughs and washing area to minimise movement inside the water pan enclosure. Reinforce the fence using thorns to prevent wild animals from entering the water pan area

### NORWEGIAN REFUGEE COUNCIL - DADAAB - 2009

The NRC Food Security and Livelihoods programme includes an environment component, with activities ranging from environmental awareness and energy saving stoves to tree planting. The NRC Food Security and Livelihoods programme is supporting refugees in Uganda and addressing environmental degradation in Dadaab refugee camp in Kenya.

The Youth Education Pack programme provides livelihood training to young people, including those who have left the pastoralist lifestyle and migrated to the city. Youth are trained in a wide range of professions from plumbing to photography. Environmental management is taught as a cross-cutting issue. This programme is supporting young refugees in Hargeisa (Somalia) and young people from displaced populations and the host community in Dadaab (Kenya). Youth Education Pack centres and warehouses in Dadaab have solar energy panels and house construction involves the use of soil for mud bricks and creating water pans where soil has been excavated.



Photo: Colin Crowley/Save the Children

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#### MALADAPTATION – OXFAM 2010 – ZIMBABWE

Farmers interviewed in Gutu district (Masvingo province) and Chirumhanzu district (Midlands province) reported that while they used to farm in demarcated, arable areas, they have been extending their fields to ecologically sensitive areas including waterways, water chains and “vleis” (seasonal lakes) in search of better soil moisture to cope with drought. One participant said: “We are now ploughing all those areas that were once forbidden, including dam catchments, wetlands and river beds and stream banks. That’s where you find water. No one is observing the distances that need to be kept from the river.”

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