Synthesis Report ● Scientific and Technical Direction

Climate change, humanitarian crises and undernutrition

A basic guide for ACF decision-makers and practitioners

Philippe Crahay

March 2010

ACF INTERNATIONAL

Non-responsibility clause

The present document aims to provide public access to information concerning the actions and policies of ACF. The objective is to disseminate information that is accurate and up-to-date on the day it was initiated. We will make every effort to correct any errors that are brought to our attention.

This information:

- is solely intended to provide general information and does not focus on the particular situation of any physical person, or person holding any specific moral opinion;
- is not necessarily complete, exhaustive, exact or up-to-date;
- sometimes refers to external documents or sites over which the Authors have no control and for which they decline all responsibility;
- does not constitute legal advice.

The present non-responsibility clause is not aimed at limiting ACF's responsibility contrary to requirements of applicable national legislation, or at denying responsibility in cases where this cannot be done in view of the same legislation.

Cover Picture
© ACF – Philippe Crahay, Ethiopia.

Thanks

I would like to thank Hélène Deret and Myriam Ait Aissa for their continuous supervision and support; Andrew Mitchell for the interesting exchanges on the strategic and operational implications of climate change; Lucile Grosjean for her major inputs in communicating the human face of climate change; Morwenna Sullivan, Samuel Hauenstein Swan, Natalie Duck, Dr Bayou and the ACF Ethiopia and Mali teams & pool desks for various inputs in terms of research and operation; the following ACF staff who contributed in climate change-related initiatives – either research, advocacy, communication or support: Adrienne Daudet, Amador Gomez, Anne-Dominique Israël, Caroline Broudic, Cécile Bizouerne, Emmanuel Cappe, Florence Daunis, Frédéric Ham, Hanna Mattinen, Isabelle Livovski, Jean Lapègue, Jean-Michel Grand, Jorge Durand, Julie Aubriot, Ludovic Bourbé, Nicolas Guibert, Nolwenn Poupon, Patricia Hoorelbeke, Rabi Guda, Rachida Mehadji, Rebecca Brown, Sabrina Valy, Silke Pietzsch, Sophie Laurence, Stéphane Frémont, Thierry Métais, the communication department, and of course M&M and those I incidentally forgot.

I'd like to thank as well the following external researchers and humanitarian stakeholders, for fruitful exchanges in terms of research and/or advocacy: Charlotte Dufour (nutrition, food security & livelihood consultant), Lars Otto Naess, Agnès Otzelberger, Thomas Tanner and Tom Mitchell (IDS), Jo Khinmaung (Tearfund), Florence Egal (FAO), Kate Ogden (WFP), Kiko Buffet (CNRS) and Lina Mahy (SCN).

Executive Summary

Climate change further exacerbates the already-huge problem of hunger and undernutrition

As humanitarian folk, one might wonder *why not to leave the issue of climate change to environmentalists or those concerned by polar bears*? The quick answer is – *because the planet is inhabited*. From the scientific journals to humanitarian reports and grassroots testimonies, much evidence has been provided on the **humanitarian implications of climate change**, yet it is only in the last few years that the "human face" of climate change has been fully acknowledged.

Climate change is not just a distant future threat, it is the main driver behind rising humanitarian needs and we are seeing its impact now. Climate change acts in conjunction with others factors, and thus is best viewed as a threat multiplier. It is changing the patterns of climate-related hazards and it magnifies the risks of disasters. It **exacerbates the risk of undernutrition** by an unprecedented scale through different pathways, respectively food-, water-, care- & health-related.

The recent food and economic crises have already strained the coping strategies of the poor, decreasing their capacity to withstand climate crises and to face the adverse effects of climate change. As a consequence, already-vulnerable populations worldwide find themselves fast-tracked along the downward spiral of poverty, livelihood insecurity and undernutrition. Adverse effects on vulnerable populations – particularly children, women and poor – will be continuously amplified in the coming years and decades, if nothing is done to address both the *causes* and the *consequences* of climate change.

Urgent actions are required to significantly reduce hunger and undernutrition in the coming years and to ensure nutrition security under a changing climate. All ACF countries and sectors of intervention are subject to adverse effects and under threat of climate change. Thus it is important that ACF sustains and scales up its efforts in addressing climate crises.

Responses to climate-related disasters and climate change

There are **four categories of responses** to face climate-related disasters and climate change. The first one, referred to as climate change mitigation focuses on the *causes* of climate change (the greenhouse gases). The 3 others categories focus on its *consequences*, respectively climate change adaptation (CCA), disaster risk reduction (DRR), and emergency/recovery responses to climate-related disasters. All these responses represent multi-sectoral approaches, which are increasingly integrated – for instance through disaster risk management.

Community-based disaster risk management (DRM) programming is an essential approach to respond to both natural disasters *and* climate change, to reduce risks and build resilience of vulnerable communities and households. Community-based DRM – presented in section 6.7 – is suggested as the key ACF programming to support climate change adaptation and disaster risk reduction among vulnerable communities.

It is particularly pertinent for ACF operations, since (i) most of the countries with a high caseload of children with severe acute malnutrition are disaster-prone and at-risk of climate change[1] and (ii) it can contribute

[1] A quick look into ACF recent operations (the past 2 years) suggest that the *major* operation "scale up" took place in response to a natural disaster (mainly climate-related), e.g. in Myanmar with the cyclone Nargis (2008), in Haiti with multiple storms (2008) and a ravaging earthquake (2010), in Kenya with the most severe drought in human memory (2008-2009), in Sahel (Mali, Chad, Niger…) that experienced erratic rainfall patterns and droughts (2009-10).

strengthening ACF strategic programming, in particular, through a more *anticipatory* programming, thus enabling a continuously-improved support to vulnerable populations.

There is little doubt that climate change – both in terms of impacts and responses – **will be further reshaping the humanitarian and development agendas and operations** in the coming years. Five important implications of climate change on the humanitarian/agenda are suggested:

- Climate change represents another wake-up call to put an end to the artificial operational divide between the "humanitarian" and the "development" spheres.
- Humanitarian and nutrition crises will further increase in the coming years.
- Climate change demands more *anticipatory* strategic programming, and an efficient use of resources.
- Climate change responses – both in terms of mitigation and adaptation – require the mobilisation of considerable financial resources; this could have adverse effects on traditional aid resources.
- Specific climate change mitigation measures can have adverse affects on the nutrition, food and livelihood security of vulnerable people; these trends should be closely monitored.

Recommendations to ACF

"If you want an analogy to guide your thinking, imagine your organization as an elephant: a big, powerful lumbering beast, very good at charging in a straight line. Now imagine teaching your elephant to dance, to be nimble, to adapt to the ever changing environment, to be ever listening to, and for, the changing context of service. That is the humanitarian agency of the future, the agency best able to cope with the complexity and context of the consequences of climate change and globalization (Peter Walker, 2008)**"**

Doing more of the same, and better, and doing new things

1. Scale up coverage of and increase access to interventions to treat acute malnutrition, especially at community level and where possible mainstreamed through existing national healthcare system.

2. Scale up comprehensive and multi-sector nutrition programming to face disasters and climate change, and expand nutrition interventions that successfully and sustainably address the immediate and underlying causes of undernutrition and develop populations' resilience to the growing impacts of climate change, e.g. hunger safety nets, nutrition education and counselling, water and sanitation, small-scale agricultural development, and income generation.

3. Mainstream community-based disaster risk management in ACF policies, strategies and operations and scale up disaster risk reduction – which require *anticipatory* programming in complement to a more traditional *reactive* programming – through risk mitigation, preparedness and capacity development. Priority actions are suggested in the table below – they can be implemented *before* and *after* a disaster occurs.

⇒ PRIORITY RISK MITIGATION ACTIONS	• Intensive support to positive coping/ adaptation strategies developed in community • Hazard-proofing water infrastructures and development of dryland water technologies • Small (supplementary) water-efficient irrigation schemes • Diversification of livelihood strategies (particularly "off-farm" livelihood strategies) • Improvement of natural resource management and effective monitoring of resources
⇒ PRIORITY PREPAREDNESS ACTIONS	• Participatory risk, vulnerability & capacity assessment • Development of effective early warning & surveillance system • Contingency/response planning & stockpiling emergency supplies in community/ country
⇒ PRIORITY CAPACITY DEVELOPMENT ACTIONS	• Involving communities & local institutions in the definition & implementation of DRM plans • Development of & support to multi-sectoral community-based DRM committees • Awareness rising, training & support of communities & institutions on DRM/ climate change • Promotion of knowledge-sharing, networking & collaboration to improve good practice

4. Prioritise efforts in disaster-prone countries presenting a high SAM caseload and/or prevalence, e.g. Afghanistan, Bangladesh, Burkina Faso, Burundi, Chad, Ethiopia, Haiti, India, Indonesia, Kenya, Pakistan, Sudan, Mali, Myanmar, Niger, Philippines, Uganda and Zimbabwe. Target the most vulnerable households and individuals in communities where the need for resilience is greatest. Ensure participatory approaches, in particular the inclusion and representation of the poorest, women & marginalized groups in community decision making & planning.

5. Build ACF rapid response and disaster risk reduction capacities, in particular (i) build the capacities of ACF staff and partners on comprehensive nutrition causal analysis & nutrition planning, DRM, DRR and adaptation; (ii) further enhance ACF global and regional contingency planning mechanisms; (iii) build additional partnerships with key stakeholders in the fields of disaster risk management, DRR and adaptation, at local, regional and global levels; and (iv) target sources of and lobbying donors for more long-term funding, in order to enable consistent vulnerability reduction and resilience building interventions.

6. Build further evidence on the links between climate factors and undernutrition and on projected effects, along with a knowledge base to inform future programming on climate change and nutrition – including in conflict-affected contexts – in partnership with prominent research stakeholders.

7. Conduct advocacy at international, regional and national levels aiming at fostering synergies between the climate change, food security and nutrition agendas, and at moderating harm that the climate change agendas and actions could have on the undernutrition issues. In particular, link community experiences and testimonies to the multilateral debate.

8. Explore ways to make ACF operations more climate and environmentally-friendly, e.g. by promoting good environmental practices (such as water-efficient techniques), by integrating climate change mitigation with specific responses (such as conservation agriculture) and by reducing carbon footprints of operations.

∴

Table of Contents

List of Figures

List of Tables

List of Boxes

1 Introduction

As humanitarian folk, one might wonder *why not to leave the issue of climate change to environmentalists and those concerned by polar bears*? A quick answer is – *because the planet is inhabited*. From the scientific journals to humanitarian reports and grassroots testimonies, much evidence has been provided on the humanitarian implications of climate change, yet it is only in the last few years that the "human face" of climate change has been fully acknowledged (adapted from OCHA, WFP & IFRC, 2009).

Climate change is happening now and it represents a major threat for the coming decades (IPCC, 2007). Newly emerging scientific evidence suggests that the pace and scale of climate change may now be outstripping even the most sobering predictions of the last report of the Intergovernmental Panel of Climate Change (IPCC) (UNEP, 2009; The Copenhagen Diagnosis, 2009). Climate change has impacts on both natural and human systems from the global to the local levels; it magnifies humanitarian crises and it poses an unprecedented challenge in addressing the already huge problems of hunger and undernutrition.

The recent food and economic crises have magnified the challenge of undernutrition (Bloem & al, 2010) — more than one billion people now suffer from hunger (FAO, 2009) and more than 19 million children under 5 are at imminent risk of dying of severe acute malnutrition in development, recovery and emergency contexts worldwide (based on FAO, 2006). Yet the crisis of undernutrition remains unaddressed and the nutrition, food and economic crises combine with the growing threat and negative impacts of climate change.

The aim of this report is (i) to provide ACF policy-makers and practitioners with basic insights about the ways climate change further exacerbates the humanitarian crises and the already-huge problems of hunger and undernutrition and (ii) to suggest orientations to ACF to face this additional challenge. This document results from an intensive literature review, from field experiences and exchanges with experts from various disciplines. It is kept concise, so that to be accessible to a broader audience. Key resources are highlighted throughout the report for further reading. The report seeks to answer 3 questions – reflected in its structure:

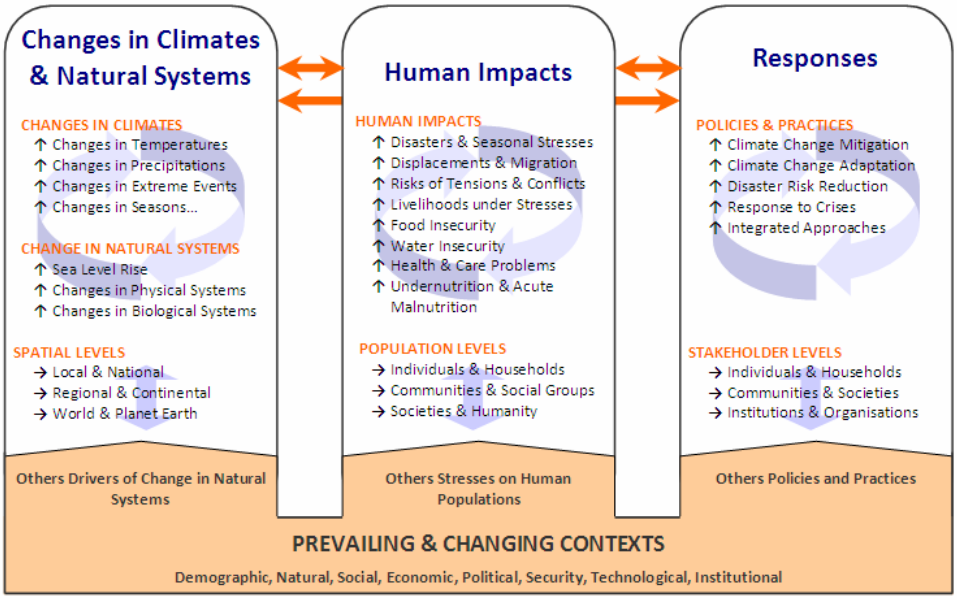


Figure 1 – A rapid overview of the impacts of climate change and the required responses
Source: ACF

1. *How are climate and natural systems changing and how are they going to change (***chapter 2***)?*
2. *What are the impacts of climate change – focusing on humanitarian crises, undernutrition and its determinants (***chapter 3, 4 and 5***)?*
3. *What are the responses to facing climate change, and what should ACF do (***chapter 6 and 7***)?*

2 Changing Climates and Natural Systems

2.1 Definitions of key climate change terms

Weather is the set of meteorological conditions (wind, rain, snow, sunshine, temperature …) at a particular time and place. By contrast, the term "climate" describes the overall long-term characteristics of the weather experienced at a place. The **climate** therefore can be thought of as a long-term summary of weather conditions, taking account of the average conditions as well as the variability of these conditions (UNISDR, 2008). The classical period of time to define this "long-term summary" is 30 years. Since the atmosphere connects all weather systems and all climates, it is sometimes useful to describe the atmosphere, oceans and Earth surface as the "global climate system" (UNISDR, 2008). The fluctuations that occur from year to year, and the statistics of extreme conditions such as severe storms or unusually hot seasons, are part of the **climate variability**. Some slowly changing climatic phenomena can last for whole seasons or even years; the best known of these is the El Niño phenomenon (UNISDR, 2008).

For most people, **climate change** means the alteration of the world's climate that we are causing, through fossil fuel burning, clearing forests and other practices that increase the concentration of greenhouse gases (GHG) in the atmosphere. This is in line with the official definition by the United Nations Framework Convention on Climate Change (UNFCCC) that attributed the change "*directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods*" (UNISDR, 2008).

Box 1 – IPCC

The IPCC is a scientific intergovernmental body set up in 1988 by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP). The role of this UN body is to provide the decision-makers and others interested in climate change with an objective source of information about climate change. So far, IPCC produced four assessment reports (in 1990, 1995, 2001 and 2007). The fifth assessment report (AR5) is expected in 2013-14. The IPCC was honoured with the 2007 Nobel Peace Prize for its fourth assessment report (AR4). URL: www.ipcc.ch

Box 2 – UNFCCC

The first assessment report of the IPCC (1990) stated that global warming was real and required actions. The Panel's findings spurred governments to create the United Nations Framework Convention on Climate Change (UNFCCC). Following the 1992 Rio Earth Summit, 192 countries around the world have joined this international treaty that sets general goals and rules for confronting climate change. In 1997, a number of nations approved the Kyoto Protocol, which has more powerful measures. New and more ambitious actions are at present discussed among countries, in the frame of the UNFCCC. URL: http://unfccc.int/].

However, the Intergovernmental Panel on Climate Change (IPCC) and scientists rather use the term for to *any change in climate over time, whether due to natural variability or as a result of human activity*. In the frame of this document, we will use the definition.

It is important to highlight that the IPCC has a broader definition of climate variability ("*natural and human-induced* fluctuations/ patterns of extreme events"), compared to the UNFCCC ("*natural* fluctuations/ patterns of extreme events").

2.2 Climate change is happening now, and fast

As a matter of fact, **climate change is happening at present**. Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.

The **temperature increase** – widespread over the globe – is greater at higher northern latitudes, and land regions have warmed faster than the oceans.

Some **extreme weather events** have changed in frequency and/or intensity over the last 50 years, as presented in the table below. Climate change is behind both more unique extreme events and more multiple events. However, because the climate system is in a constant state of flux and has always exhibited natural fluctuations and extreme conditions, it is not possible to argue that any single extreme event is attributable to climate change (UNISDR, 2008).

Climate change induces as well **changes in precipitation and in seasons**. Precipitation trends from 1900 to 2005 suggest significantly increases in eastern parts of North and South America, northern Europe and northern and central Asia, whereas precipitation declined in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. The changes in climate are therefore **plural** (changes in temperatures, in extreme events, in precipitations, etc.). For this reason, the term *global warming* has been progressively replaced by the term *climate change*.

The observed changes in climate also **vary from region to region, and within regions**. Climate scientists have evidence and understanding of these regional changes. To be noted, there is a notable lack of geographic balance in data and literature on observed changes, with marked scarcity in developing countries (IPCC, 2007). It is difficult to get scientific insights of observed changes at local levels in these countries.

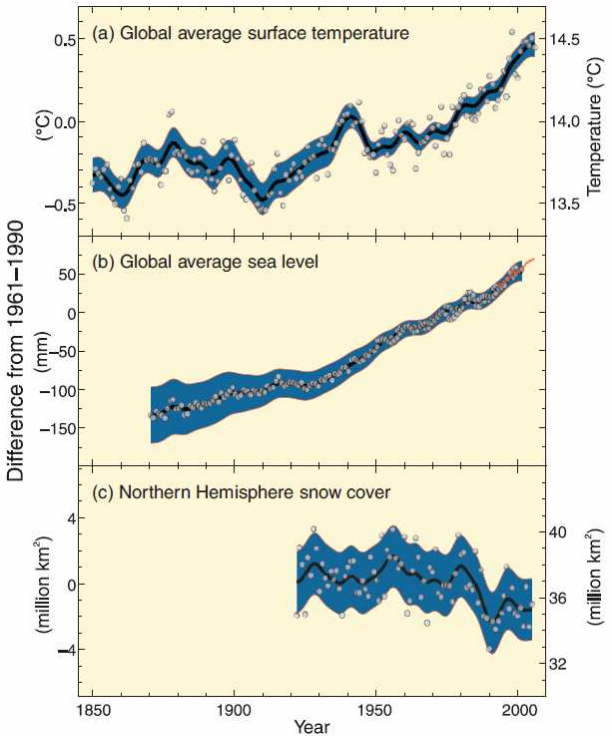


Figure 2 – Signs of change

Source: IPCC, 2007. **Note**: Observed changes in **(a)** global average surface temperature; **(b)** global average sea level from tide gauge (blue) & satellite (red) data; and **(c)** Northern Hemisphere snow cover for March-April. All differences are relative to corresponding averages for the period 1961-1990. The shaded areas are the uncertainty intervals.

Table 1 – Observed changes in extreme weather events

Extreme event	Observed changes over the last 50 years
Heat waves	It is likely that heat waves have become more frequent over most land areas
Heavy precipitation events	It is likely that the frequency of heavy precipitation events (or proportion of total rainfall from heavy falls) has increased over most areas
Incidence of extreme high sea level	It is likely that the incidence of extreme high sea level has increased at a broad range of sites worldwide since 1975
Droughts	Globally, the area affected by droughts has likely increased since the 1970s

Source: Adapted from IPCC, 2007

Note: in IPCC reports, particular, or a range of, occurrences/ outcomes of an uncertain event owning a probability of are said to be: >99% = virtually certain; >90% = very likely; >66% = likely; 33 to 66% = about as likely as not; <33% = unlikely; <10% = very unlikely; <1% = exceptionally unlikely (Source: IPCC AR4 WG3 glossary).

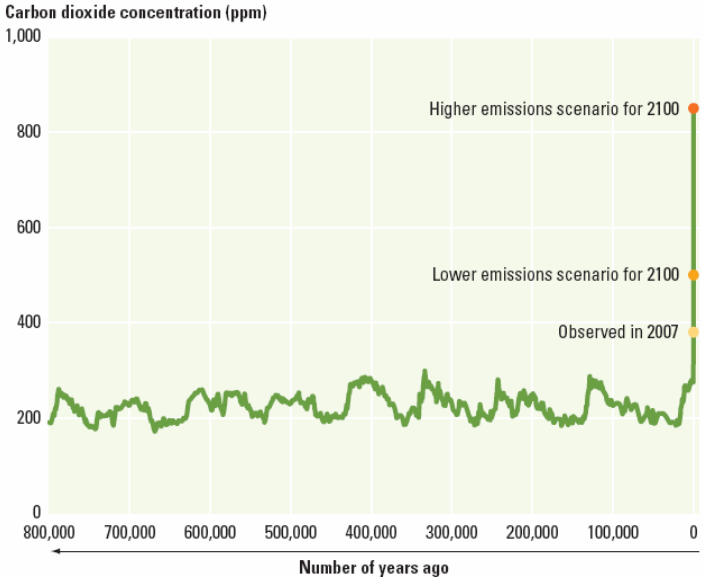
Recent observations and publications suggest that climate change is now **happening faster** and accelerating beyond expectations. For instance, global ice-sheets are melting at an increased rate; and Arctic sea-ice is disappearing much faster than recently projected (The Copenhagen Diagnosis, 2009).

Changes in climate systems are accompanied by **changes in natural systems**, e.g. enlargement and increased numbers of glacial lakes; upward shifts in ranges in plant and animal species; changes in ice cover, increased runoff and earlier spring peak discharge in many glacier- and snowfed rivers; earlier timing of spring events; shifts in fish abundance in high-latitude oceans; reduction of biodiversity, etc.

2.3 What causes climate change?

The IPCC's Fourth Assessment Report (2007) estimates that it is very likely that **human activities** – not natural variations – are mainly responsible for the warming seen since 1950. Humans are changing the climate by modifying an important parameter of the global climate system: the greenhouse gases (GHG).

Human activities produce several **greenhouse gases**. The first is carbon dioxide (CO_2), which comes chiefly from burning fossil fuels, from destroying forests, etc. The second is methane (CH_4) given off by landfill sites, rice paddies, cattle, etc. There are others greenhouse gases (nitrious oxide or N_2O and the halocarbons – group of gases containing fluorine, chlorine or bromine), but CO_2 and CH_4 are the main problems. Global atmospheric concentrations of CO_2 (but as well of CH_4 and N_2O) have increased markedly as a result of human activities since 1750. When the Industrial Revolution had begun transforming Europe, atmospheric CO_2 was at about 270-280 ppm (parts per million). Now global concentrations of CO_2 in the atmosphere reach 387 ppm. They exceed by far the natural range over the last 800,000 years, as illustrated in the figure below. Human activities have exacerbated the **greenhouse effect**: the Earth's "gas blanket" is growing thicker and trapping more solar heat, what is warming the atmosphere.



Note: Analysis of air bubbles trapped in an Antarctic ice core extending back 800,000 years documents the Earth's changing CO_2 concentration. Over this long period, natural factors have caused the atmospheric CO_2 concentration to vary within a range of about 170 to 300 parts per million (ppm). As a result of human activities, the present CO_2 concentration of about 387 ppm is about 30 percent above its highest level over at least the last 800,000 years. In the absence of strong control measures, emissions projected for this century would result in a CO_2 concentration roughly two to three times the highest level experienced in the past 800,000 or more years, as depicted in the two projected emissions scenarios for 2100.

Figure 3 – Off the charts with CO_2

Source: World Bank, 2009

Change in climate and natural systems are **bond to continue for a long time**. Many greenhouse gases are in fact very long-lived (e.g. the CO_2 "lifespan" in the atmosphere is over 100 years; current CO_2 emissions will then have an influence on the climate change in the next century). They would go on having effects even if we managed to stop emitting CO_2, CH_4 and the other GHG tomorrow, due to the time scales associated with climate processes and feedbacks, even if GHG concentrations were to be stabilised. These **climate feedbacks** represent also an increasing source of preoccupation for scientists and governments. The climate system evolves in time under the influence of its own internal dynamics and due to changes in external factors that affect climate (referred to as "climate forcing", e.g. changing the concentration of GHG in the atmosphere). The climate system responds directly, as well as indirectly, to changes in some properties of its building blocks through a variety of **feedback mechanisms**. There are many feedback mechanisms in the climate system that can either amplify ("positive feedback") or diminish ("negative feedback") the effects of a change in climate forcing. Recent observations suggest that some important **positive feedback mechanisms** are already very active, therefore amplifying climate change. For instance, melting of Siberian permafrost induces the release of important amounts of methane (CH_4) in the atmosphere, which to warm the Earth even more.

Many climate scientists believe that if the CO_2 level reaches about **450 ppm** – which might relate to about 2°C increase compared to pre-industrial levels – there will be serious trouble, because then there will be no way of slowing down the warming of the atmosphere. The rate of CO_2 in the atmosphere is now rising at about 2 ppm every year. At present rates the amount of atmospheric CO_2 could reach the 450 ppm mark in about 35 years – before the middle of this century. That's why there is no time to waste.

2.4 Climate change will lead to more turbulence in the coming decades

Whilst there is evidence that our climate is changing as a result of human activities, understanding and **forecasting future changes** remains a significant challenge. *Prediction is very difficult, especially if it's about the future* (Niels Bohr, Danish physician): this applies with force to climate. Future climates will indeed depend on many interrelated factors, whose individual evolutions are not easy to grasp (e.g. emissions of CO_2 in the coming decades). There are therefore inevitable **uncertainties** in climate prediction sciences.

For the past 20 years, scientists have worked on **climate predictions** – or climate forecasts – using a range of climate models (a numerical representation of the climate system). The overarching process considered by IPCC to predict future climates rely upon the emissions of greenhouse gases. IPCC defines different scenarios in terms of emissions, referred to the SRES scenarios (with reference to IPCC Special Report on Emissions Scenarios; SRES, 2000). These scenarios are grouped into 4 scenario families (A1, A2, B1 and B2) that explore alternative development pathways.

The IPCC highlights that unless we drastically cut the amount of greenhouse gases going into the atmosphere, the probable **global temperature rise by 2100** will be between 1.8°C and 4°C (with lower and upper boundaries of 1.1°C and 6.4°C). That may not sound very much. But the increase in temperature between the end of the last Ice Age in the northern hemisphere – about 12,000 years ago – and today is only about 4.5°C. And that was a very different world (adapted from Panos, 2008). In addition, this rise in temperature will not be uniform around the global (e.g. some regions could experience even higher increases, such as the northern latitudes). It is important to remind as well that global temperature is only one parameter of climate change: plural changes – at regional and local levels – will accompany changes in global temperature (e.g. in terms of precipitations, seasons, etc.).

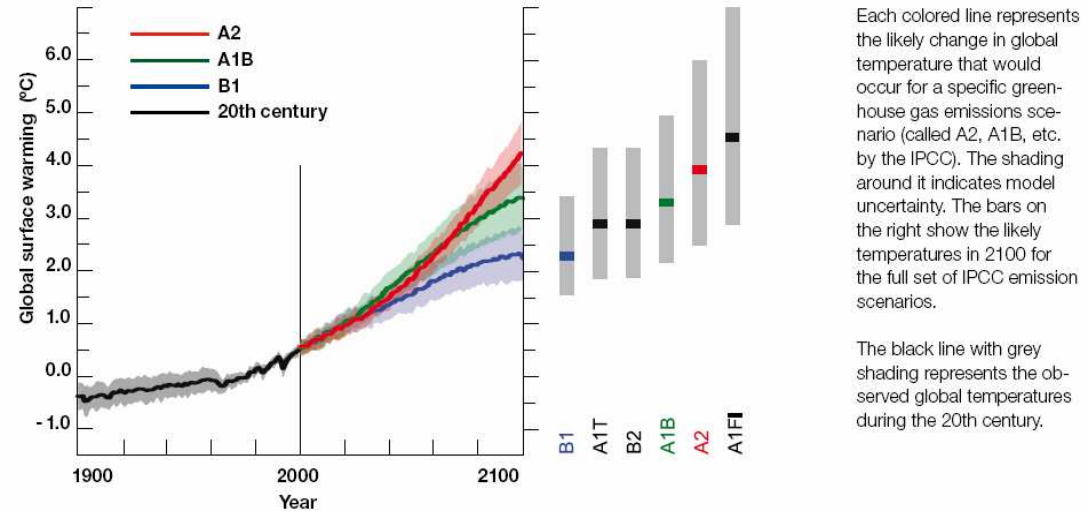


Figure 4 – Warming scenario for the 21st century

Source: IPCC, 2007 in IFRC, 2007. Climate guide

The fourth report of the IPCC also predicted the following changes, which will amplify along with the increase in GHG concentrations and temperatures:

- The snow cover and sea ice will further decrease; Arctic summer sea ice is likely to disappear in the second half of this century;
- The precipitation patterns will change considerably;
- The seasonal patterns will be disrupted in many parts of the globe;
- The sea levels are likely to rise by up to 59cm;
- Some parts of the world will see an increase in the frequency and intensity of extreme weather events, as illustrated in the table below;
- Natural systems (environments and natural resources) will be significantly affected.

Table 2 – Projections for extreme weather events

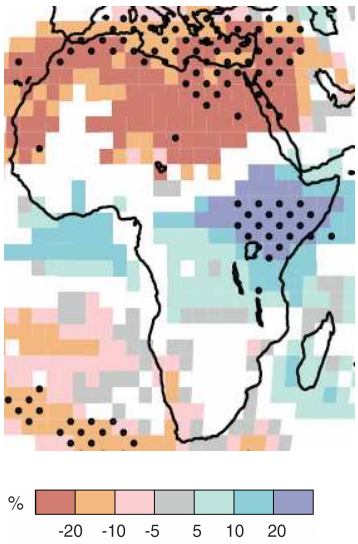
Phenomenona and direction of trend	Likelihood of a human contribution to observed trend	Likelihood of future trends for 21st century
Warmer and fewer cold days and nights over most land areas	Likely	Virtually certain
Warmer and more frequent hot days and nights over most land areas	Likely –nights)	Virtually certain
Warm spells/heat waves: frequency increases over most land areas	More likely than not	Very likely
Heavy precipitation events: frequency (or proportion of total rainfall from heavy falls) increases over most areas	More likely than not	Very likely
Area affected by droughts increases	More likely than not	Likely
Intense tropical cyclone activity increases	More likely than not	Likely
Increased incidence of extreme high sea level (excludes tsunamis)	More likely than not	Likely

Source: IPCC, 2007. AR4 WG1

Note. The table above correlates phenomena related to extreme weather events with the likelihoods that the trends already occurred in late 20th century and would be sustained in the 21st century, along with the likelihood of a human contribution to observed trends. As highlighted before, it is difficult to state whether or not a single extreme weather event is a consequence of human-induced climate change or part of the natural climate variability; however it is clear that the frequency and intensity of natural disasters are likely to increase.

Predictions shouldn't disregard the fact that important changes in climate and natural systems are **taking place now**; in popular perceptions, the impacts of climate change have been perceived for too long as rather distant negative outcomes, e.g. taking place at the end of this century.

As stated above, the IPCC predictions are limited by **uncertainties**; e.g. in some regions, specific climate models predict an increase in precipitations in the coming decades, while another range of models predict a decrease in rainfall, as illustrated in the figure below (where white areas reflect uncertainties). These uncertainties tend to be greater for small spatial scales.



Predicted patterns vary from region to region. Predictions – with certain levels of uncertainty – exist at regional, at national levels and increasingly at local levels. Unfortunately **predictions are generally lacking at local levels in less developed countries**. The lack of "localised" information and the higher uncertainties existing at local levels in some developing countries are definitely embarrassing. In fact government planners, private sector and non-governmental organisations need detailed sub-national or local information.

The figure on the left illustrates multi-model projected patterns of precipitation changes in Africa (**Source**: snapshot in IPCC, 2007), and more specifically the relative changes in precipitation (in percent) for the period 2090-2099, relative to 1980-1999 for the period from June to August. White areas are where less than 66% of the models agree in the sign of the change and stippled areas are where more than 90% of the models agree in the sign of the change.

Figure 5 – Projected patterns of precipitation changes in Africa

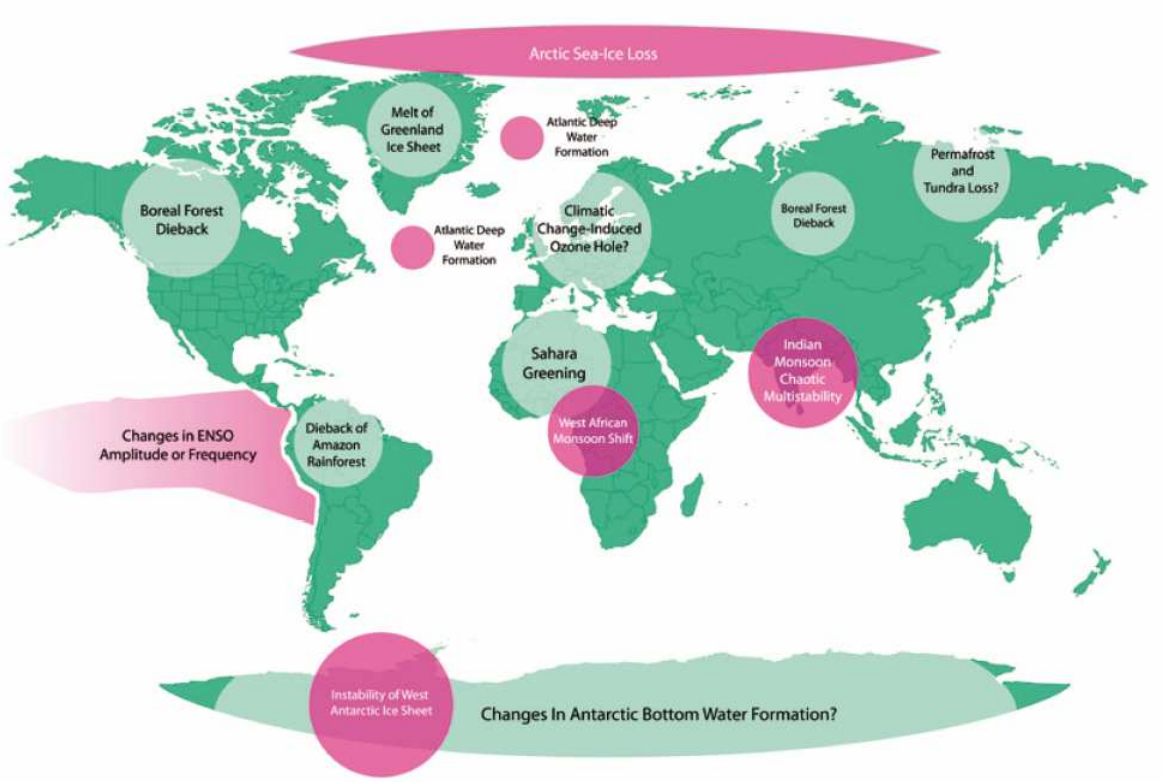
"Uncertainty is inevitable, but risk is certain": Even though there are uncertainties in climate-related analyses, current trends and future horizons are worrying, if nothing is quickly done.

2.5 Accelerating trends, worsening predictions and the risk of abrupt climate change

Two years and a half only after the release of the latest IPCC report (which is based on scientific publications up to the end of 2005), the pace and scale of climate change may now be outstripping even the most sobering predictions in this report. Climate change and its impacts are occurring **much faster and sooner** than expected, and scientific predictions get more and more alarming as one goes along the refinements of climatic models. In others terms, the more our climate scientists improve their understanding of climate and the more climate models are fined, the more future horizons look worrying:

- The Massachusetts Institute of Technology (MIT) recently developed the most comprehensive modelling yet carried out on the likelihood of how much hotter the Earth's climate will get in this century; his model shows that without rapid and massive action, the problem will be about twice as severe as previously estimated a couple of years ago - and could be even worse than that (MIT, 2009);
- Until the summer of 2007, most models projected an ice-free September for the Arctic Ocean towards the end of the current century; reconsideration based on current trends has led to speculation that this could occur as soon as 2030 (UNEP, 2009);

- Recent estimates of the combined impact of melting land-ice and thermal expansion of the oceans suggest a plausible average sea level rise of between 0.8 and 2.0 metres above the 1990 level by 2100; this compares with a projected rise of between 18 and 59 centimetres in the last IPCC report (The Copenhagen Diagnosis, 2009; UNEP, 2009, etc.);
- Climate-related thresholds or tipping points, beyond which the climate system is in an unstable status that leads to abrupt or irreversible climatic shifts and powerful positive feedback mechanisms (refer to section 2.3), may now be reached in a matter of years or a few decades (UNEP, 2009; World Bank, 2009, etc.); tipping point elements in the climate system are presented in the figure below, along with their transition time-scale and impacts.



Tipping element	Triggering level of warming	Transition timescale	Key impacts
Disappearance of Arctic summer sea-ice	+0.5–2°C	~10 years (rapid)	Amplified warming, ecosystem change
Melting of Greenland ice sheet	+1–2°C	>300 years (slow)	Sea-level rise of 2–7 meters
Melting of West Antarctic ice sheet	+3–5°C	>300 years (slow)	Sea-level rise of 5 meters
Collapse of Atlantic thermohaline circulation	+3–5°C	~100 years (gradual)	Regional cooling in Europe
Persistence of El Niño-Southern Oscillation (ENSO)	+3–6°C	~100 years (gradual)	Drought in Southeast Asia and elsewhere
Indian summer monsoon	N/A	~1 year (rapid)	Drought
Sahara / Sahel and West African Monsoon	+3–5°C	~10 years (rapid)	Increased carrying capacity
Drying and dieback of Amazon rainforest	+3–4°C	~50 years (gradual)	Biodiversity loss, decreased rainfall
Northward shift of boreal forest	+3–5°C	~50 years (gradual)	Biome switch
Warming of Antarctic bottom water	Unclear	~100 years (gradual)	Changed ocean circulation, reduced carbon storage
Melting of tundra	Ongoing	~100 years (gradual)	Amplified warming, biome switch
Melting of permafrost	Ongoing	<100 years (gradual)	Amplified warming from release of methane and carbon dioxide
Release of marine methane hydrates	Unclear	1,000 to 100,000 years	Amplified warming from release of methane

Source: Adapted from Lenton and others 2008.

Figure 6 – Potential tipping points elements in the climate system: Triggers, time-scale and impacts

Source: Adapted from The Copenhagen University, 2009 (upper part) and Lenton &al, 2008 in World Bank, 2010 (down part)

The climate record for the past 100,000 years clearly indicates that the climate system has undergone periodic and often extreme shifts referred to as **abrupt climate changes**, sometimes in as little as a decade or less. The mechanisms of onset and evolution of past abrupt climate change and associated climate thresholds – referred as **tipping points** – are not well understood (IPCC, 2007). The triggering of events is likely to be the result of multiple processes. Risk of abrupt climate change increase along with temperatures; climate scientists consider that these risks start to rise considerably if we overcome a 2 or 3°C threshold (refer to World Bank, 2009). With unabated emissions, many trends in climate will likely accelerate, leading to an increasing risk of abrupt or irreversible climatic shifts.

In summary

⇒ *Changes in climate and natural systems are happening now in many regions and communities*

⇒ *Changes are bond to continue for a long time*

⇒ *Changes are plural; there are changes in temperatures, in precipitation patterns, in seasonal patterns and in the environments*

⇒ *The observed and predicted changes in climate vary from region to region and within regions*

⇒ *Climate change and its adverse effects are occurring much faster and sooner than expected; scientific predictions get more and more alarming as one goes along the refinements of climatic model*

⇒ *Tipping points may now be reached in a matter of years or a few decades, if nothing is quickly done*

⇒ *Predictions – with certain levels of uncertainty – are generally lacking at local levels in less developed countries*

3 Yielding More Disasters and Humanitarian Crises

Modern *Homo sapiens* evolved around 200,000 years ago. However, only during the last 12,000 years – a period in which the Earth's climate has been comparatively warm and stable – have humans really thrived. During the stable climate conditions of this period, humans discovered how to cultivate plants and domesticate animals. These discoveries – which occurred between 8,000 and 6,000 BC – ultimately led to modern societies of today, since they enabled many more people to thrive simultaneously on Earth by controlling food availability (adapted from The Copenhagen University, 2009).

The IPCC and world climate scientists told us that within less than a century – climatic and temperatures conditions could be very different from what we've experienced if no consistent action is taken. Recent scientific models climate suggest even higher increases in temperatures – if nothing is done.

Yet the illustration on the right and alarming predictions on future horizons shouldn't put out of sight one important thing: *the future has already started*.

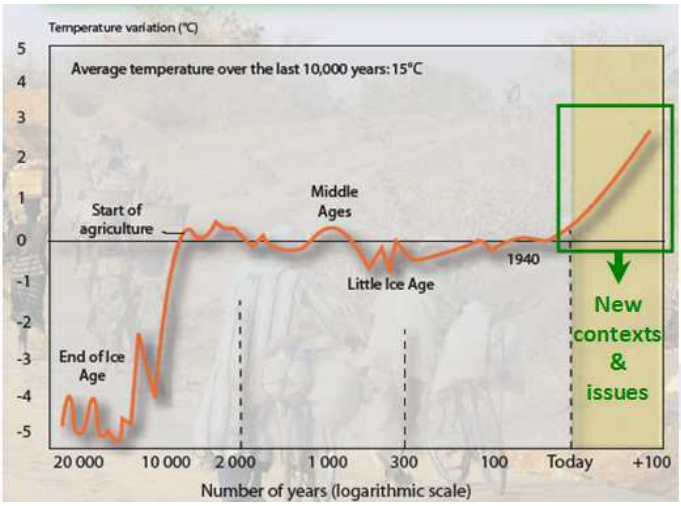


Figure 7 – Evolution of Earth's temperatures in the last 20 000 years
Source: Adapted from CILSS, FAO & al, 2008

3.1 Climate change is changing the patterns of hazards and it magnifies disaster risk everywhere

Before looking at trends in terms of disasters, it is useful to highlight what is a **disaster**. According to the United Nations International Strategy for Disaster Reduction (UNISDR, 2009), a disaster *is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources*. The disasters are often described as a result of the combination of (i) the exposure to a **hazard**; (ii) the conditions of **vulnerability** that are present; and (iii) insufficient **capacity** or measures to reduce or cope with the potential negative consequences. The conditions for a disaster are often summarized through the following equation:

$$\text{DISASTER RISK} = \frac{\text{EXPOSURE TO HAZARD} \times \text{VULNERABILITY}}{\text{CAPACITY}}$$

Note: Hazards by themselves do not cause disasters - it is the combination of an exposed, vulnerable and ill prepared population or community with a hazard event that results in a disaster (UNISDR, 2008).

A **hazard** (which can be referred to a "shock" in the livelihood literature) is *a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage* (UNISDR,

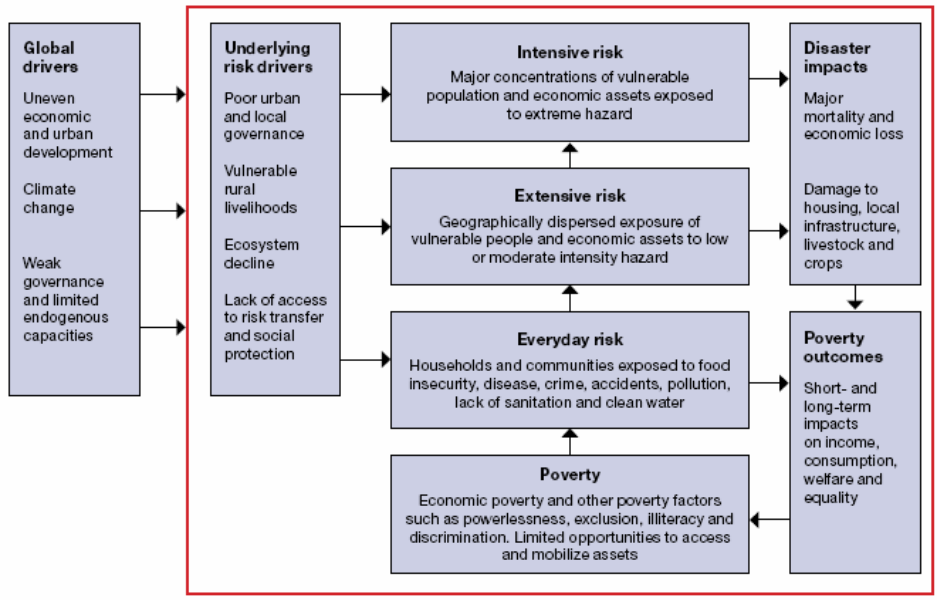
2009). There are different types of hazards: geological (e.g. earthquake, tsunami, volcanic eruption), hydro-meteorological (e.g. flood, cyclone, drought), technological (e.g. industrial pollution, nuclear accident) or biological in nature (e.g. epidemy). In the frame of this report, we focus on the hydro-meteorological hazards also referred to **climate-related hazards** (e.g. tropical cyclones, floods including flash floods, drought, heatwaves and cold spells) (adapted from UNISDR, 2009).

Global climate change magnifies the **risk of disasters** everywhere, but especially in those parts of the world where there are already high levels of human vulnerability (CARE, OCHA & Mapplecroft, 2008). Global climate change will **affect disaster risks in two ways**, firstly through the likely increase in climate-related hazards (as illustrated in table 1 and 2), and secondly through increases in the vulnerability of communities to natural hazards, particularly through ecosystem degradation, reductions in water and food availability, and changes to livelihoods (UNISDR, 2008); the second pathway will be described in the coming sections.

The IPCC has confirmed that the geographic distribution, frequency and intensity of climate-related hazards (or "extreme weather events") are already being altered significantly by climate change (IPCC, 2007 in UNISDR, 2009); refer to the table 1. In addition global climate change is expected to increase the severity and frequency of climate-related hazards in the future (IPCC, 2007); refer to the table 2. For this reason, some argue that the natural disasters are not "natural" anymore, since humans added their footprint on the patterns of hazards. It is important to note that we just don't know when or where climate-related disasters will occur (Feinstein International Center, 2010). It is good to remind that it is not possible to argue that any single extreme event is attributable to climate change (UNISDR, 2008). Rather, it is more appropriate to say that global climate change makes *certain types of events more likely* or that *certain events followed some trends*. Specific examples of recent disasters that clearly fit the trend of rising risks due to climate change include the European heatwaves of 2003 (which killed over 35,000 people); the massive flooding during the Asian monsoon of 2007; and floods following droughts in various parts of Africa (adapted from IFRC, 2009).

The global climate change is a key driver of disaster risk, but not the only one. It acts *in conjunction with* others risk drivers (e.g. vulnerable livelihoods, ecosystem decline, etc.), as highlighted in the figure below.

Figure 8 – The disaster risk – poverty nexus



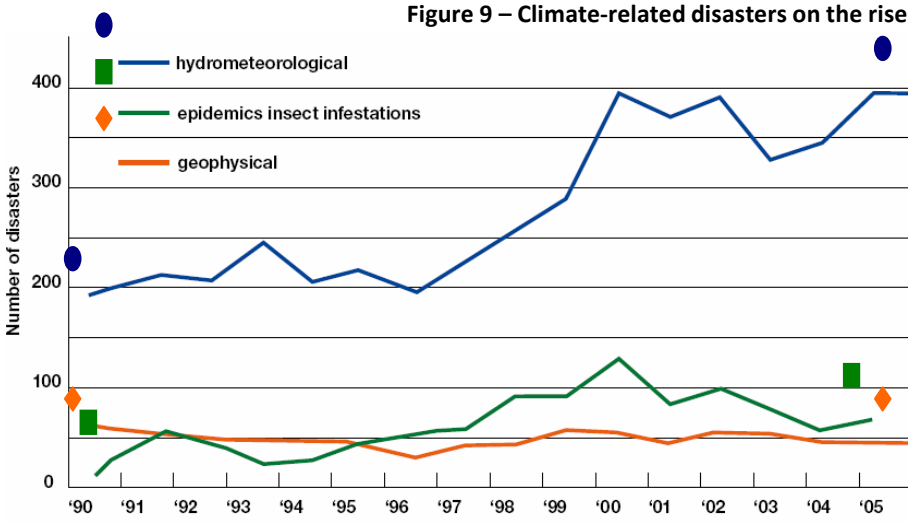
Note: At the global level, drivers such as economic development and urbanization, climate change and the strength or weakness of a range of endogenous capacities condition the landscape of both poverty and disaster risk in any given country. […] A range of underlying risk drivers, such as poor urban governance, vulnerable rural livelihoods and declining ecosystems, contribute to the translation of poverty and every day risk into disaster risk, in a context of broader economic and political processes (UNISDR, 2009).

Source: UNISDR, 2009. Global Assessment Report on Disaster Risk Reduction

The **number of reported climate-related disasters** has more than doubled this decade compared to the nineties.

Reported **floods** alone have increased four-fold since the beginning of that decade; the year 2007 saw floods in 23 African and 11 Asian countries that were the worst in memory (Oxfam, 2009).

Figure 9 – Climate-related disasters on the rise



Source: CRED EM-DAT in IFRC, 2008

"During the last gadas (8-year period) *we had good rains. I don't know what tomorrow will bring but all I know is that the rains are changing – it is becoming less and it is falling at the wrong time. Jilo Aga brought drought; at that time drought came once in eight years, it now comes almost every year now. My daughter is now five years old and she has not seen a good harvest yet."* Tome Dheeda, 45 years old, Harallo, agro pastoral area

Source: ACF, IDS & Tearfund climate change adaptation research

The **droughts** are as well of particular concern. The areas affected by droughts have increased, and the frequency, intensity and/or duration of droughts have changed. Roughly 38 percent of the world's land area is exposed to some level of drought, representing 70 percent of the global population and the same proportion of agricultural production. By 2020, up to 250 million additional people in sub-Saharan Africa could have their livelihoods and prospects compromised by a combination of drought, rising temperatures, and increased water stress. Extreme drought conditions are expected to affect eight percent of land area by 2020, and no less than 30 percent by the end of the century. A very large increase in both the spread and the severity of drought will leave almost a third of the planet with extreme water shortages by the end of this century (respectively World Bank, 2005; UNDP, 2008; Save The Children, 2008; Hadley Centre, 2006 in Feinstein International Center & al, 2010). 53 per cent of African disasters are climate-related and one-third of African people live in drought-prone areas.

Between 1991 and 2005, 3,470 million people were affected by disasters, 960,000 people died, and economic losses were US$ 1,193 billion (IASC & UNISDR, 2009), poor countries being disproportionately affected. More than two-thirds of these disasters were related to weather extremes. Since the 1980s, the average number of people reported as affected by climate-related disasters has doubled, from 121 million to **243 million a year**; according to Oxfam (2009), this number could rise **up to 375 millions a year as soon as by 2015**.

Climate-related disasters lead to widespread death, injuries, diseases, post-traumatic stresses and/or destruction of livelihood assets. They exacerbate **livelihood, food and water insecurity**. Disasters work against the gains made in aid programs and threaten to undermine the resilience of poorer communities and households to absorb loss and recover from disaster impacts (UNISDR, 2009). According to the IPCC, due to the

very large number of people that may be affected, **undernutrition linked to extreme climatic events** may be one of the most important consequences of climate change (IPCC, 2007. AR4 WG2 Ch8).

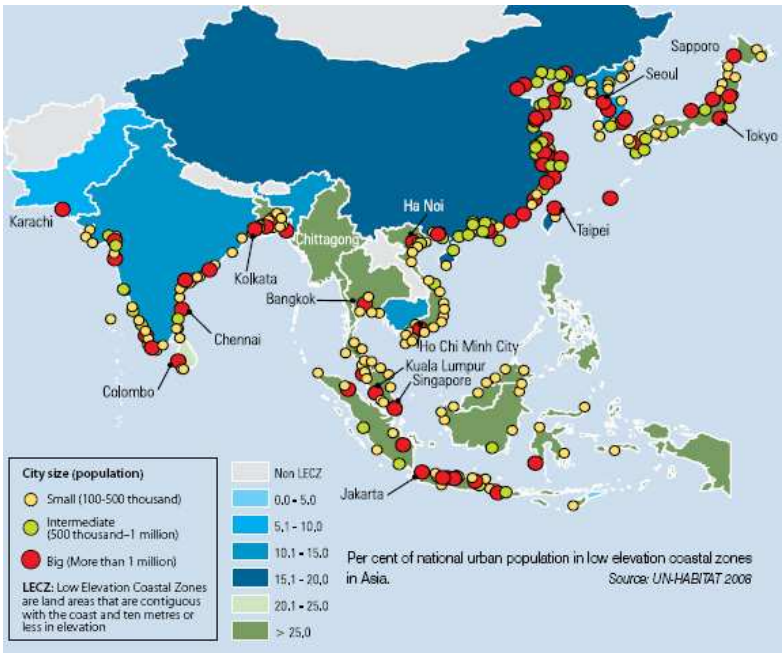
3.2 The rising sea levels pose threats to low lying coastal areas and inlands

The **rising sea levels** – induced by global climate change – amplify coastal erosion and the risk of flooding and storm surge in low-lying areas. More than 600 millions people live in at-risk coastal areas a few meters above existing sea levels, three quarters of which are located in the Asian flood-prone river deltas or in low-lying small island states (IASC & UNISDR, 2007). According to USAID (2009), at least 150 million people live within 1 meter of high tide level, and 250 million live within 5 meters of high tide. Almost two-thirds of mega-cities with populations greater than 5 million fall, at least partly, in low-lying flood-prone areas. 21% of the urban populations of least developed nations live in such environments (ibid.).

Half the world's people now live in cities, a share that will rise to 70 percent by 2050. Of urban population growth (5 million new residents a month), 95 percent will be in the developing world, with small cities growing fastest. Urban areas concentrate people and economic assets, often in hazard-prone areas as cities have historically prospered in coastal areas and at the confluence of rivers.

Note: At greatest risk are the densely populated Asian mega-deltas of rivers including the Yangtze (China), Ganges-Brahmaputra (Bangladesh), Mekong (Cambodia), and Irrawaddy (Myanmar). Other major mega-deltas at risk are the Nile (Egypt), Niger (Africa) & Mississippi (USAID, 2009).

Figure 10 – Asian cities at risk from storm surge and sea level rise



Source: UN-Habitat, 2008; **Note**: LECZ = Low Elevation Coastal Zone

In 2005, the first communities to be evacuated from **sinking islands** were moved out from Vanuatu in the Pacific. In a few decades, low-lying coastal areas and parts of or even entire inlands will be submerged by sea water as a consequence of rising sea levels, if nothing is done. Some small island developing states (SIDS) – will only be a memory or an attraction for divers. The myth of Atlántida has never been so concrete.

3.3 Climate change amplifies displacements and migrations

Climate change is already causing **migration and displacement** and will lead to more human flows, as a consequence – among others – of climate-related disasters, physical water scarcity, environmental degradation, significant permanent losses in territory as a result of sea level; and/or violence over shrinking natural resources (adapted from CARE, 2009; NRC, 2009; IASC typology in OCHA & al, 2009).

Although there is limited reliable data on the subject, the scale of such flows, both internal and cross-border, is expected to rise significantly over the next decades as a result of climate change (IOM, 2009). Recent estimations for climate change-induced migration are presented in the table below.

Table 3 – Recent estimations for climate change-induced migration

Human flows	Estimation	Source	Year
People displaced by climate-related sudden-onset natural disasters in 2008	20 million	OCHA	2009
Environmentally displaced people by 2010	50 million	UNFCCC	2007
Refugees due to climate change by 2050	250 million	Christian Aid	2007
People to become permanently displaced "climate refugees" by 2050	200 million	Stern	2006

Source: adapted from ADB, 2009

Note: One should be cautious when dealing with the estimations of numbers of "climate refugees" (also referred to as "climate migrants", "environmental migrants", etc.), since there is not one common definition and the names and numbers are coloured by different discourses and agendas (such as the environmentalist, security, protection, etc.) (NRC, 2009).

According to the ADB (2009), climate change and environmental deterioration needs to be rather understood as an *additional factor* among an array of existing factors driving migration, such as economic, social and developmental factors. Climate change is a key driver of migration and displacement, but *not the only one*; it acts *in conjunction with* others risk drivers.

CARE (2009) considers that the consequences of migration for almost all aspects of development and human security could be devastating. There may also be substantial implications for political stability (CARE, 2009). Some argue that climate change will trigger environmental conflicts that in turn trigger migration; there are also those who argue that migration may in itself trigger environmental conflicts (NRC, 2008). IOM (2009) also considers a two-way relationship between migration and the environment: environmental factors precipitate migration and migration can affect the environment (IOM, 2009); migrants can in fact add further pressure in the areas of destinations.

The **migration of rural households into slums** is of particular concern. Many slums are situated in parts of cities that are most at risk of climate change impacts, meaning that rural migrants may face renewed environmental threats if they settle in these areas (DRC, 2008). As of 2005, an estimated one billion people resided in slums, and a further increase in slum populations would make the challenge of providing basic services to slum residents even greater.

In general, it is not the poorest of the poor who will move (ADB, 2009). They lack the resources to fund the risk and to gather the information about land networks to potential destinations, and therefore to anticipate or adapt to environmental deterioration through migration (ibid.).

3.4 Would the changing climates fuel tensions and conflicts?

Many studies propose that climate change may also exacerbate the **struggle for access to, and control of, scarcer resources**, which, in turn, may increase the likelihood of tensions or even armed conflict with severe impacts on the lives and livelihoods of affected populations. For instance, according to International Alert (2007), many of the world's poorest countries and communities face a double-headed problem: that of climate change and violent conflict. There is a real risk that climate change will compound the propensity for violent

conflict, which in turn will leave communities poorer, less resilient and less able to cope with the consequences of climate change (ibid).

> *"Previously, conflict was mainly about heroism and raiding of cattle. Now the conflict between Borena and neighbouring clans is about securing pasture and water and also for territorial integrity."*
>
> **Obbo Arero Jateni**, 80 years old, Dire Woreda, Ethiopia, Agro pastoral area; **Source**: ACF, IDS & Tearfund climate change adaptation research

However, the links between climate change and conflict remain **complex and poorly understood** (Crisis Group, 2007). Some others experts argue that climate change can exacerbate pre-existing socio-political tensions in conjunction to others factors (in others terms, as one factor amongst others). A combination of conditions – including poverty, inequality and poor governance – is typically required for tensions to erupt in outright conflict (adapted from CARE & al, 2008). Although environmental change likely never has been and never will be the sole or proximate cause of deadly conflict, it can contribute to conditions that make it more likely or severe (Crisis Group, 2007).

3.5 Capturing the broader contexts

Climate change and associated environmental shifts can lead to more disasters, more migration and possibly more tensions. However, climate change – as highlighted in the former sections – is **one driver of stresses among others**, and therefore the connections between climate change and specific outcomes (e.g. disaster, migration) are complex. It is therefore essential **to capture the broader contexts**.

For instance, disasters results from the interplay between a hazard and a vulnerability context. Increased flooding or landslides and reduced fresh water supply — can also be caused by local environmental change such as deforestation or road building. Migration can result from failures in livelihoods, induced by the double-edged effect of a drought and high food prices.

Climate change cannot be held "responsible" alone of humanitarian crises. **It shouldn't be an excuse or a scapegoat** to externalise more local problems – this applies with force to conflict or natural resource degradation.

In summary

⇒ *Climate change has a "human face": it is yielding more human crises*

⇒ *Climate change and rising sea levels magnifies the risk of disasters*

⇒ *Climate change amplifies displacements and migrations, and it might possibly exacerbate the struggle for access to, and control of, scarce resources*

⇒ *Climate change acts in conjunction with others factors; it is best viewed as a threat multiplier; it is therefore essential capturing the broader contexts*

4 Changing Faces of Hunger and Undernutrition

4.1 A livelihood-nutrition analytical framework

A **livelihood-nutrition analytical framework** – presented in the figure below – is proposed in order to capture the multiple impacts and threats of climate change on undernutrition. The livelihood approach represent in fact a good "platform" between climate change and the different pathways that lead to undernutrition. This framework is based on three frameworks, respectively the framework presented in Black & al (2008) (which is based upon the UNICEF framework of 1992, subsequently adapted by ACF), the DFID livelihood framework (DFID, 1999) and the WFP food and nutrition security framework (WFP, 2009).

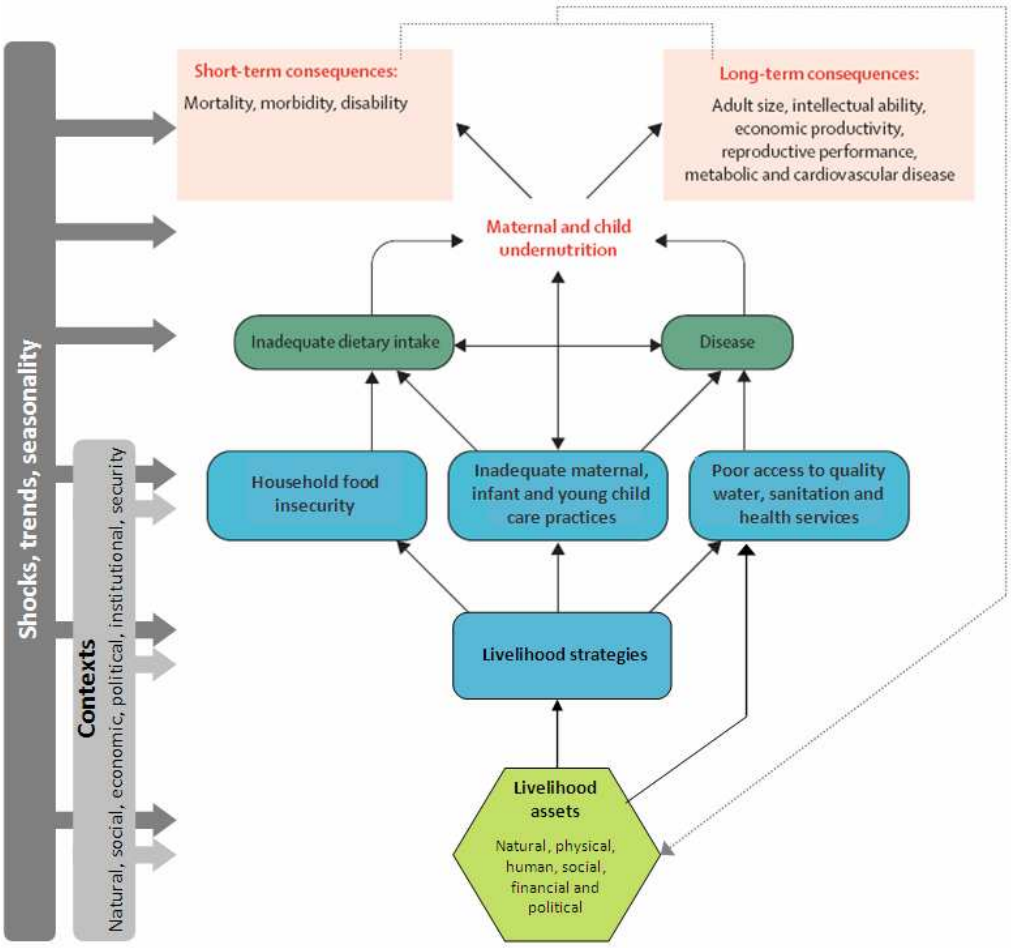


Figure 11 – Livelihood-nutrition analytical framework

Source: ACF (2010), based on Black & al, 2008; UNICEF, 1992; DFID, 1999 and WFP, 2009

The framework above is a **causal analysis** that considers the immediate, underlying and basic causes of undernutrition, and their interplay with livelihoods. A livelihood comprises capabilities including assets or capital (natural, physical, human, social, financial) and activities (referred to as livelihood strategies – e.g. cultivation, livestock-keeping, trade, remittances) used by a household for its means of living. A households' livelihood is secure when it can cope with and recover from shocks and stresses, and maintain or enhance its capabilities and productive asset base (based on Chambers and Conway, 1992).

Inadequate dietary intake and disease are the immediate causes of undernutrition. Inadequate food consumption heightens vulnerability to infectious diseases, which, in turn, can prevent the body from absorbing adequate food. These immediate causes stem from underlying causes characterised by insufficient access to safe and appropriate food, inadequate maternal, infant and young child care practices, poor access to quality water, sanitation and health services. These underlying causes represent "negative livelihood outcomes". The immediate and underlying causes make up the determinants of undernutrition.

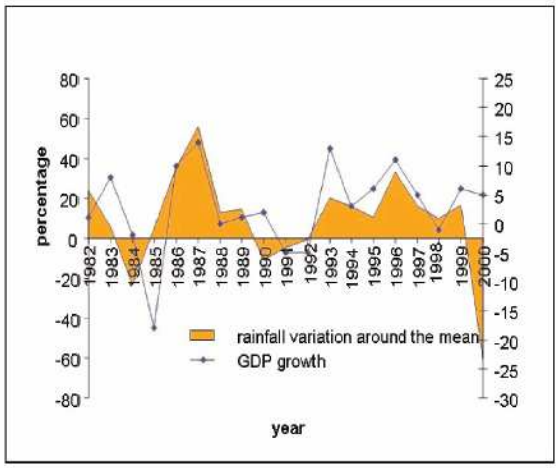
The livelihoods and the determinants of undernutrition – analysed at individual, household and community levels – are influenced by local, national, regional and/or global factors. The analysis of these factors focuses respectively (i) on the natural, social, economic, political, institutional and security contexts and (ii) on the exposure to shocks and stresses (in the livelihood literature, shocks and stresses relate respectively to shocks, negative trends and seasonality; shocks relate to "very rapid-onset" hazards, e.g. cyclones, or "rapid-onset hazards", e.g. droughts; negative trends can referred to as "slow-onset hazards", e.g.; desertification or sea level rise).

4.2 Climate change magnifies livelihood insecurity

How is your family? How is your herd?
How is the season/ the environment?
Traditional greeting among Touaregs (and in others ethnic groups in Sahel)

Before analysing the impacts of climate change on livelihoods, it is important to illustrate **how important local climates and natural resources are** for the populations living in poor countries – predominant rural households, as illustrated by the Touaregs traditional greetings or the figure on the right. The livelihood strategies of poor rural households' – e.g. farming, pastoralism, fishing or forest-based livelihoods (and often, a combination of these) – are heavily dependent on climatic factors and the natural resources they access.

Figure 12 – GDP and rainfall in Ethiopia



Source: The World Bank. "Managing Water Resources to Maximize Sustainable Growth: A Country Water Resources Assistance Strategy for Ethiopia." 2005.

Source: World Bank, 2005 in USAID, 2007

Climate factors often determine water availability, food production or the revenues the household can get from an activity, as illustrated by the convergence between the national GDP and rainfall variability in Ethiopia.

Climate-related shocks (or hazards) – e.g. droughts or cyclones – already figure prominently in the lives of many of the world's poor households. As presented in section 3, climate change is changing the patterns of climate-related hazards such as droughts, floods and storms and it magnifies the risk of disasters everywhere. "Natural" disasters negatively affects livelihood assets (e.g. impacts on health status of household members, deaths of livestock, etc.), and thus exacerbate livelihood insecurity. Climate-related shocks also affect urban areas: as highlighted in the former section, many slums are situated in parts of cities that are most at risk of climate change impacts.

Box 3 – Changes observed in seasons

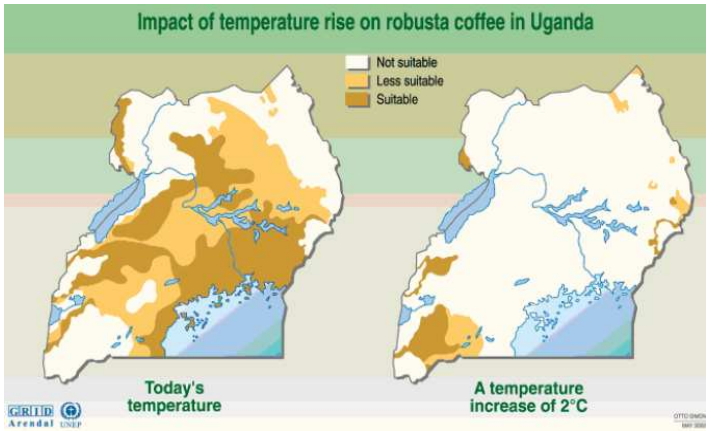
In a recent report entitled *What happened to the seasons?* from Oxfam (2009), farmers all over the world report that both the timing and the pattern of seasonal rains are changing dramatically. Seasons, farmers say, are becoming less distinct. Observations – which are strikingly consistent across entire geographies – include the following:

- Seasons appear to have shrunk in number and variety, to be replaced by seasons that are now seen simply as 'hotter and dry' or 'hotter and wet'. Winters are generally warmer.
- Rainfall is more erratic, coming unexpectedly in and out of season, and tending to be shorter in duration (in some areas) and more violent.
- Even within recognisable seasons, 'unseasonal' events such as heavier rains, drier spells, unusual storms, dense fogs, and temperature fluctuations are increasing.
- Winds and storms are felt to have increased in strength.

Seasonality is another important source of stresses in the lives and livelihoods of poor rural communities, which lead to seasonal hunger and undernutrition (see ACF & IDS, 2008. *Seasons of Hunger*). Climate change modifies seasonal patterns and can exacerbate seasonal stresses. For example, rainfall is reported to be more erratic, shorter and more violent in many communities in developing countries (Oxfam, 2009). Many smallholder farmers depend upon rain-fed agriculture as their main livelihood strategy; in sub-Saharan Africa for instance, rain-fed agriculture covers 96% of all cultivated land (FAO, 2007). These farmers are dependent on the timing of rains and intra-seasonal rainfall patterns. The "changing seasonality" is a crucial influence on farmers' ability to decide when best to cultivate, sow, and harvest their crops (Oxfam, 2009), and which ultimately determine the success or failure of their crops.

Climate change induces or worsens negative trends in the **environment and natural resources** on which populations depend for their lives and livelihoods, including the loss of local biodiversity which provides essential food and medicine. For instance, climate change affects the coastal populations in two slow-onset pathways – it is important to note that at least 150 million people live within 1 metre of the high tide level, and 250 million live within 5 metres of the high tide (USAID, 2009). Firstly, rising sea levels induced by global climate change amplify coastal erosion and the risk of storm surges in low-lying areas, threatening livelihood assets. Secondly, climate change, in synergy with other factors, affects the marine ecosystems and fish stocks (CCD, 2009), damaging fishing livelihoods that constitute important sources of food and income for coastal residents. According to the Feinstein International Center & al (2010), land degradation (including erosion, glacier/ice melt and desertification) will be the most complex of all physical climate change consequences, since it has serious consequences for agriculture, food security, and livelihoods.

Figure 13 – Impact of changing temperatures on coffee crop in Uganda



Source: UNEP, sa

An illustration of negative trend (or slow-onset hazard) is provided through the impact of changing temperatures on coffee crop in Uganda in the picture on the left. In Uganda, a two-degree rise in annual average air temperatures is predicted to devastate the coffee crop. Basically Uganda will cease being a coffee-growing nation. It will lose 25% of its annually international earnings and a massive portion of its domestic economy. How will the government react, with fear and oppression or with enlightened empowerment of its people? (Walker, 2008).

Increased exposure to climate-related disasters and seasonal and environmental stresses has profound **effects on the socio-economic as well as the political and institutional context**. It can force population groups to radically change their livelihoods and/or move to other regions (e.g. urbanisation), thus leading to a re-composition of socio-economic and ethnic groups and the relationships between them. It can also exacerbate tensions between population groups for access to diminishing resources. These changes can put considerable stress on traditional and modern political institutions and social solidarity mechanisms. These factors directly or indirectly affect the determinants of undernutrition.

Coping and adaptation strategies

In face of climatic shocks and stresses, households resort to livelihood responses, which include coping strategies and adaptation strategies. **Coping strategies** are defined here as generally short-term strategies, motivated by a crisis and oriented towards survival, and **adaptation strategies** represent strategies oriented towards longer-term livelihood security (CARE, 2009); refer to the table below. A study conducted by ACF, IDS & Tearfund in Ethiopia and Mali (2009) suggests that attempts to label an activity as "coping" or "adaptation" strategy can sometimes prove fruitless and misleading; for many strategies identified in Ethiopia and Mali, it is not possible to clearly distinguish between the two. This study suggests that coping and adaptation may be seen as part of a **continuum of livelihood responses**, rather than as separate concepts.

Table 4 – How is adaptation different from coping?

Coping	Adaptation
• Short-term and immediate • Oriented towards survival • Not continuous • Motivated by crisis, reactive • Often degrades resource base • Prompted by a lack of alternatives	• Oriented towards longer term livelihoods security • A continuous process • Results are sustained • Uses resources efficiently and sustainably • Involves planning • Combines old and new strategies and knowledge • Focused on finding alternatives

Source: CARE, 2009

Some **coping or adaptations strategies** are successful, in the sense that they do not (further) undermine the livelihood assets of household members, e.g. the diversification of livelihoods or the selection of more-drought resistant breeds. However, some of these strategies may directly or indirectly undermine the livelihood asset basis and the nutrition status of people, e.g. the reduction of dietary diversity, the sale of productive assets or the intensive and uncontrolled marketing of firewood and charcoal. Some strategies can have both positive and negative outcomes. Migration for instance can represent an unavoidable response strategy to shocks and stresses, which allows alternative sources of income (a positive outcome). However migration can also contribute to the destructuration of local communities and institutions or put further strain on the already heavy workload of women (SC, 2009). For instance, in Sahel and in the Horn of Africa, men commonly migrate during periods of drought, leaving the women alone to look after their children, work in the fields, tend the herds and manage the home. This can compromise their ability to provide proper care to infants, heightening the risk of undernutrition.

> *Undernutrition (…) can be explained by the fact that we have lost cattle due to lack of rain. The drought killed our cattle, forcing us to change our way of life. People are finding it hard to adapt and cope with these changes. Our husbands have all left to make a living in the city, leaving only women and children in the village.*
>
> Mother, village of Toula, Kanem, Chad (2009)

The table below illustrates coping and adaptation strategies among (agro-) pastoral households in Borena (Ethiopia).

Table 5 – Illustrations of coping/adaptation strategies among (agro-) pastoral households in Borena (Ethiopia)

Type	Response strategy	Wealth group
"***Negative***" (depleting assets)	Increased sale of livestock	All
	Increase sale of charcoal and firewood	Poor
	Change in food consumption patterns – reduction in frequency and quality of food intake	Poor
Both "negative" and "positive"	Increased labour migration	Poor, middle
	Increase livestock migration (travel longer distance for longer periods of time)	Poor, middle
"***Positive***" (establish or increase household assets)	Increase in *Kallo* (water pond) formation (preservation of pasture)	All
	Water harvesting	All
	Planting short maturing crop varieties	All
	Increase in petty trade activities	Poor
	Increase in sales of gum Arabic and incense	Poor
	Vegetable farming	All

Source: ACF, IDS & Tearfund climate change adaptation research

The bare ground you see now used to be a forest - we have destroyed it. Now we have no rainfall, it is just very hot. I knew that the trees brought rain. We cut down the trees and I know that we have made the rains disappear. But what can I do? I have no choice...

Focus Group Discussion, Dhire, Ethiopia

We used to have lots of millet at home. Now I rely on wild plants. My husband is a forger, he makes tools for the farmers. It used to go very well, but now that it rains so little, people are not interested in that any more. So I do pottery, I make pots and jars and so on and I sell them.

Aissatou Ganamé, 45, from Sana

Source: ACF, IDS & Tearfund climate change adaptation research

The response strategies and the changes in livelihood strategies adopted by households are often a **response to a variety of triggers** (e.g. to a droughts and to high food prices). They should be considered within a set of interconnected systems (e.g. demographic, economic, social, political, ecological systems). In others terms, a strategy implemented by a household generally result from the conjunction of various factors.

The poor in developing countries are more at risk from the impacts because of their **limited capacity to cope** with existing climate variability and future change (DFID, 2004) and their limited livelihood options. The study conducted by ACF, IDS & Tearfund suggests that the poor households – even though if extremely resourceful when faced with shocks and stresses – are often **"locked" into certain livelihood strategies** and responses that can further exacerbate their vulnerabilities. It is important to note that the recent food and economic crises have already strained the coping strategies of the poor (FAO, 2009), decreasing their capacity to withstand current and future climate crises and to face threats of climate change.

As a consequence of an increased exposure to climate-related disasters, seasonal, slow-onset climatic stresses and strained response capacities, already-vulnerable populations worldwide find themselves fast-tracked along the downward spiral of poverty, livelihood insecurity and undernutrition.

The case study below illustrates how a climatic stress (late rains) led to malnutrition in Gao, Mali.

Box 4 – Case study in Mali – from late rains to acute malnutrition

Eighty percent of Malians get their income from farming and cattle breeding. As a result they are heavily dependent on climatic conditions, particularly rainfall. A perception of changing rainfall patterns feature prominently among pastoral communities in the Gao Region in Northern Mali. This is detrimental to people's key assets, cattle and farmland, which are vulnerable to climate risks.

Last year, the rains arrived in August in Gao, almost a month and a half later compared to a normal season. When eventually rainfall arrived, it only fell inconsistently, flooding some areas while others were left without a drop. According to Mohammed Al Karim, a nomadic cattle herder from Gao:

For the last five years, the rains have been arriving later and later. Animals are dying of hunger and thirst because of this. What's more, many illnesses are developing: the cattle are so weak that by the time the rains finally arrive, they have already fallen ill or died. All kinds of animals have died this year, even camels and donkeys, which are extremely resistant. Some people have lost more than 100 animals. […] More and more people are quitting livestock herding and moving to the towns. The problem is that many do […] are often unemployed.

The pastoralists traditionally implement diverse coping strategies in facing droughts and low pasture availability, such as – for instance – moving with their animals to others areas better deserved with pasture, buying fodder, or selling animals before they get too weak or die.

These two last coping strategies are influenced by the markets. Last year, the price of fodder for animals has been considerably increased (up to four times the normal prices), reflecting an increased demand but as well the speculative behaviour of local traders. In addition, many pastoralists started selling their animals before they die, generating important decreases in the prices of animals. Some households couldn't save their animals, and reported having lost from 50% to 90% of their livestock.

Pastoralists in Gao are dependent upon the markets to get most of their income – from the sale of animals or animal products – but as well to satisfy their food needs. Last year, some households from Gao reported difficulties in getting sufficient food to feed their families, as a consequence of high food prices, low prices of animals and deteriorating terms of trade – e.g. some herders reported that they had to sell five goats for a sack of millet, when it would normally cost just one.

In Gao, acute malnutrition is generally less present among pastoral populations, compared to urban or farming households. The children can benefit from the nutritious milk of the animals. However last year milk production was lower in these pastoral communities, due to the lack of pasture or the sale of animals. Lower milk availability and difficulties in purchasing sufficient food in the markets caused a rapid deterioration in the nutritional status of the most vulnerable children in the pastoral areas last year. ACF implemented – among others – a supplementary feeding program in order to prevent a nutritional crisis.

It is interesting to note that an innovative early warning/ surveillance system developed by ACF Mali contributed in alerting major stakeholders of the risks of crisis and in fostering preventive measures. This early warning/ surveillance system is based Geographic Information Systems (GIS); it monitors water resources and vegetation production – and therefore pasture availability, two essential resources for pastoral livelihoods.

Source: ACF, 2009 (based on a press field visit conducted by Lucile Grosjean in Mali)

4.3 Climate change acts as a multiplier of existing threats to food security

> *In the fight against hunger we could now be facing a perfect storm of challenges, including climate change and increasingly severe droughts and floods, soaring food prices and the tightest supplies in recent history, declining levels of food aid, and HIV/AIDS, which also aggravates food insecurity.*
>
> J. Sheeran, director of the World Food Programme (Lancet, 2008)

The three past years have been devastating years for the world's hungry: the recent food-price and economic shocks have further jeopardized the problems of hunger and undernutrition. The FAO estimated that these crises have deprived an additional 175 million people of access to adequate food (based FAO, 2008 and FAO 2009), and **more than one billion people** are now estimated to suffer from hunger.

Climate change acts as a **multiplier of existing threats** to food security. It will affect all four dimensions of food security: availability, accessibility, stability and safe and healthy use of food (or "food utilisation") (based on IASC, 2009).

Global climate change pose a major threats to **food availability** across a range of pathways: (i) By changing overall growing conditions (general rainfall distribution, temperature regime and carbon); (ii) By inducing more extreme weather such as floods, drought and storms; and (iii) By increasing extent, type and frequency of infestations, including that of invasive alien species (UNEP, 2009).

Figure 14 – Climate change impacts and threats on agriculture, forestry & ecosystems

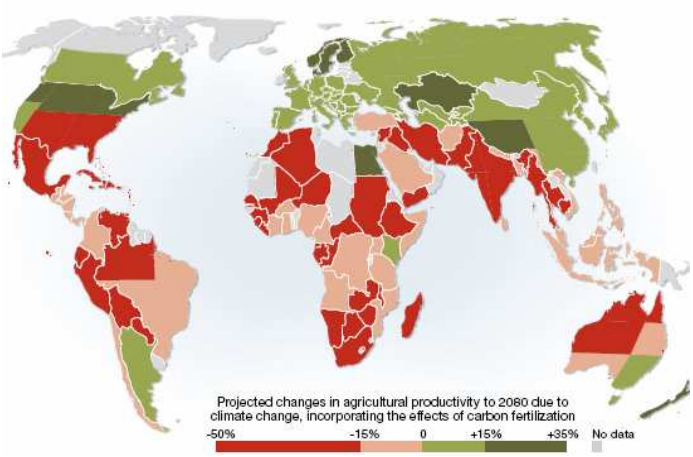
Climate driven phenomena	Agriculture, forestry and ecosystems
TEMPERATURE CHANGE Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights	Increased yields in colder environments Decreased yields in warmer environments Increased insect outbreaks
HEAT WAVES/ WARM SPELLS Frequency increases over most land areas	Reduced yields in warmer regions due to heat stress Wildfire danger increases
HEAVY PRECIPITATION EVENTS Frequency increases over most land areas	Damage to crops Soil erosion Inability to cultivate land due to waterlogging of soils
DROUGHT Affected areas increase	Land degradation Crop damage and failure Increased livestock deaths Increased risk of wildfire
CYCLONES AND STORM SURGES Frequency increases	Damage to crops Windthrow (uprooting) of trees Damage to coral reefs
SEA LEVEL RISE Increased incidence of extreme high sea-level (excluding tsunamis)	Salinisation of irrigation water, estuaries and freshwater systems

Source: UNEP, 2009

Climatic factors combines with others key factors in decreasing food availability, such as scarcity arising from global population increase, changing food demands (for meat and dairy rather than grain), and shifts from food to biofuel production.

Rural communities, particularly those living in already fragile environments, face an immediate and ever-growing risk of increased **crop failure**, **loss of livestock**, and reduced availability of marine, aquaculture and forest products. Shocks and stresses on livelihoods result in less food being produced or less income to purchase food. And this might occur at times of high(er) food prices. Negative impacts of climate change on crop production are already observed and will further increase in the coming decades, as illustrated in the figure below. Rainfed agriculture will be hardly hit by climate change, particularly in marginal semi-arid zones with prolonged dry seasons.

Figure 15 – Projected changes in agricultural productivity to 2080



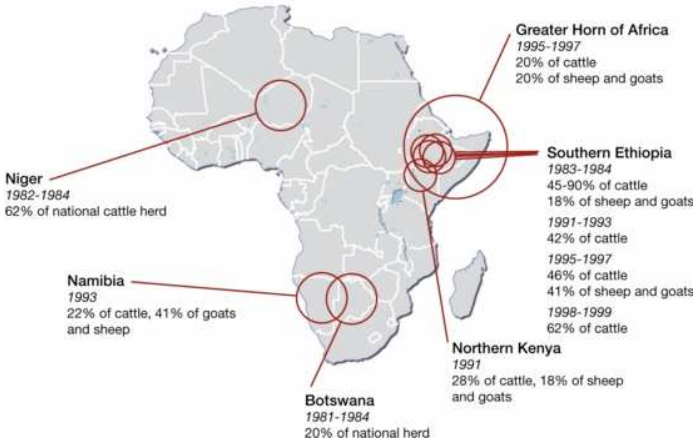
Source: Cline 2007 in UNEP, 2009. *The environmental food crisis*

> *Nature needs to find its normal path again. The earth no longer feeds us enough, crops are poor and only support a family's food needs for 3 months. And then what do they do?*
>
> Mr N'Douba, Mao, Chad
>
> ACF field visit in Kanem, 2009

The increased incidence of extreme weather affects and represent a major threat in terms of livestock, meat and milk production; the figure on the illustrates the considerable impacts of droughts on herds, based on historical evidence.

Rising atmospheric CO2, climate change and others environmental change could promote further invasions of Invasive alien species (CCD, 2009). Increases in invasive species pose a major threat to food production (CCD, 2009).

Figure 16 – Selected drought events and impacts in Africa (1981-99)



Source: IPCC. 2007. AR4 – WG2 – Ch5 in Grida

http://maps.grida.no/go/graphic/selected-drought-events-in-africa-1981-1999-and-livestock-impacts

The increase in frequency and severity of production shortfalls, and in variability in annual production are projected to lead to **greater future price volatility** and risks of speculation (based on CCD, 2009 and DFID, 2009). According to IFPRI (2009), climate change will result in additional **price increases** for the most important agricultural crops – rice, wheat, maize, and soybeans. Higher food prices cause an immediate and direct jump in hunger levels, as illustrated during the 2008 food crisis for instance (during which low production levels in Australia and China – subsequently to droughts – represented an important determinant of the food crisis).

Change in the atmospheric concentrations of carbon dioxide – the main driver of climate change – will alter the nutritional value of crops including protein contents, glutin content of grains, and toxin levels from pests and diseases (GermanWatch & al, 2008). Partly as a consequence of climate change, the safe and healthy use of food is deteriorating as the poor switch to more monotonous diets, which lack essential micronutrients, and as hazards such as flooding increase the prevalence of diarrheal diseases and malaria, which in turn affects food use (CCD, 2009).

4.4 Hundreds of millions of people risk being exposed to a growing scarcity of water

> *Several water points in the village have been damaged by cyclones. One pump still worked, but because everyone went there to fetch water, it is now out of order. We have been forced to drink dirty water and there have been cases of diarrhoea, fever and scabies.*
>
> Charles, village of Dociné, Haiti, ACF field visit, 2009

Safe and reliable access to **clean water and good sanitary conditions** are essential for good nutrition. Water resources – in terms of availability, quantity, quality and movement – are predicted to be strongly impacted by changing temperatures and levels of precipitation, with wide-ranging consequences for human societies and ecosystems (based on IPCC, 2008 and Feinstein International Centre & al, 2010).

Hundreds of millions of people risk being exposed to a **growing scarcity of water** (IPCC, 2007), water stresses and droughts. By 2025, 1.8 billion people will live in countries or regions suffering from a shortage of water (FAO, 2007); refer as well to the section 3.1. Reduced water availability could results from various factors, e.g. reduction of rainfall in some areas or rising sea levels leading to increase of saline intrusions in coastal areas and affecting fresh groundwater, such as in Bangladesh. Climate-related disasters – on the rise – can destroy water points and infrastructures.

Figure 17 – Climate change impacts and threats on water resources

Climate driven phenomena	Water resources
TEMPERATURE CHANGE Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights	Effects on water resources relying on snow melt Effects on some water supply
HEAT WAVES/ WARM SPELLS Frequency increases over most land areas	Increased water demand Water quality problems, e.g. algal blooms
HEAVY PRECIPITATION EVENTS Frequency increases over most land areas	Adverse effects on quality of surface and groundwater Contamination of water supply Water stress may be relieved
DROUGHT Affected areas increase	More widespread water stress
CYCLONES AND STORM SURGES Frequency increases	Power outages cause disruption of public water supply
SEA LEVEL RISE Increased incidence of extreme high sea-level (excluding tsunamis)	Decreased freshwater availability due to salt-water intrusion

Source: UNEP, 2009

Closely interlinked with water scarcity is **agricultural productivity** and **food production**, which will become riskier and less profitable in many developing countries as the climate continues to change. Agriculture accounts for nearly 70% of the water consumption, with some estimates as high as 85% (Hanasaki et al., 2008 in UNEP, 2009). Water flows supporting agriculture are expected to decrease, exacerbating pre-existing pressures in some areas already experiencing water stress (Feinstein International Centre & al, 2010). Warming temperatures also mean that water supply stored in glaciers and snow cover will decline with consequent risks to agriculture immediately downstream of these sources. This has been intensively observed in the past 10 years in Afghanistan, a country dependent on snowfall for its water resources, and the patterns of snow cover and melting are now changing (e.g. reduced snowfall or more rapid melting of snow, which reduce the period during which water is available for agriculture).

Increased water stresses can in turn **exacerbate tensions or migration processes**. Hegemonial relationships in transboundary rivers lead to unequal and inefficient water sharing and allocations; it will become an increasingly important issue as the effects of climate change increase (CCD, 2009). It can put further strain on the already heavy **workload of women** – traditionally in charge of water collection in many developing countries – and compromise their ability to provide proper care to infants.

Water scarcity and/or reduced quality can have enormous health impacts on the poor, and will impact on the incidence of **water-related diseases** as a consequence of alterations in rainfall, surface water availability and water quality (IPCC, 2007. AR4 – WG2 – Ch8). Less water means poorer hygiene and sanitation (e.g. lack of water for hygiene or washing food, reduced capacity to run sanitation plants and human excreta disposals), which may lead to an increase in diarrheal disease and other diseases associated with poor hygiene (CCD, 2009). Too much water poses well threats to health. **Floods** have a dramatic impact on water quality, especially in term of contaminating water sources with faecal and biological material; rates of diarrheal disease, including cholera, may increase after the event of a flood, especially in areas where sanitation facilities are poor. Heavy rainfall, even without flooding, may increase rates of diarrheal disease. With heavy precipitation events expected to become more common, rates of diarrheal diseases may increase, and it is likely that the most vulnerable populations will suffer the greatest burden (CCD, 2009).

4.5 Climate is already contributing to the global burden of disease and premature death

Figure 18 – Climate change impacts on human health

Climate driven phenomena	Human health
TEMPERATURE CHANGE Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights	Reduced human mortality from decreased cold exposure
HEAT WAVES/ WARM SPELLS Frequency increases over most land areas	Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially isolated
HEAVY PRECIPITATION EVENTS Frequency increases over most land areas	Increased risk of deaths, injuries, infectious, respiratory and skin diseases
DROUGHT Affected areas increase	Increased risk of malnutrition Increased risk of water- and food-borne diseases
CYCLONES AND STORM SURGES Frequency increases	Increased risk of deaths, injuries, water and food-borne diseases Posttraumatic stress disorders
SEA LEVEL RISE Increased incidence of extreme high sea-level (excluding tsunamis)	Increased risk of deaths and injuries by drowning in floods Migration-related health effects

Source: UNEP, 2009

Climate change is already contributing to the **global burden of disease and premature death**, and this contribution is expected to grow in the future. According to the Lancet (2009), climate change has been responsible for 5,5 million disability adjusted life years (DALYs - combines the time lived with disability and the time lost due to premature mortality) lost in 2000; although influential in stimulating action on climate change, these initial assessments of the disease burden attributable to climate change were conservative (Lancet, 2009). Effects of climate change on health will affect most populations in the next decades and put the lives and wellbeing of billions of people at increased risk. Thus the Lancet (2009) considers climate change as the biggest global health threat of the 21st century.

Climate change exacerbates **extreme weather events** – such as heatwaves, floods, storms, fires and droughts – and thus leads to an increase of the number of people suffering from death, disease and injury (based on IPCC, 2007. AR4 – WG2 – Ch8). Flooding and storms has other health effects, such as the risk of diarrheal disease and outbreaks of vector-borne diseases (CCD, 2009).

Many important diseases are highly sensitive to changing temperatures and precipitation, e.g. malaria, dengue and diarrhoea. Climate change modifies the **range of infectious disease vectors** and the **distribution of disease pathogens and pests** (based on IPCC, 2007. AR4 – WG2 – Ch8), e.g. it will favour the spread of diseases into previously unaffected areas. Climate change may induce the appearing of or the re-appearing of water borne pathogens.

Climate-related shocks can also have a severe impact on the **mental health** of those affected (Fritze & al, 2008; IFRC, 2009). Distress, depression and anxiety after extreme events have been reported and may result in

prolonged impairment (IPCC, 2007 in CCD, 2009). Trauma brought about by climate change influences the ability of mothers to care for their children.

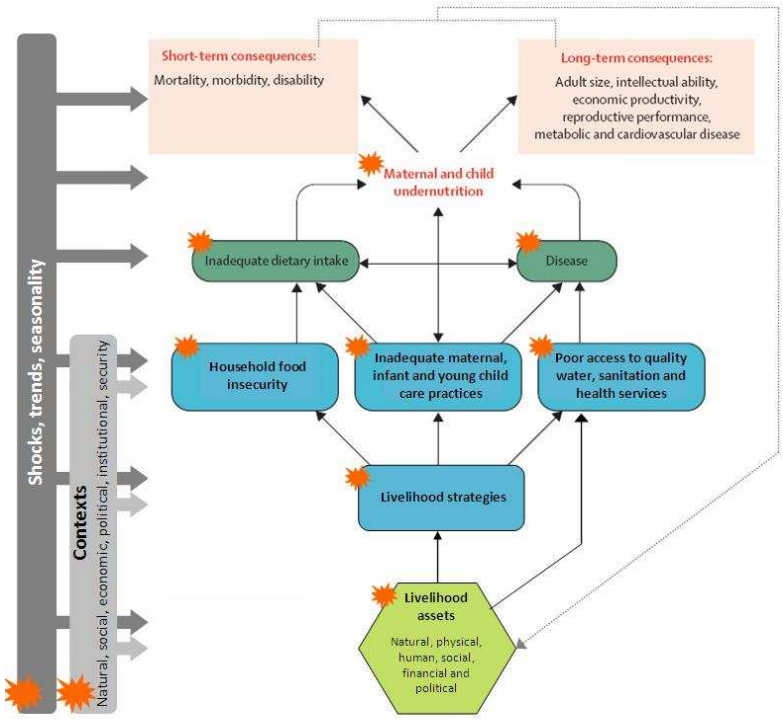
According to the Lancet (2009), the **indirect effects** of climate change on water, food security, and extreme climatic events are likely to have the biggest effect on global health. In turn, a bad health generally induces substantial consequences on productivity and negative livelihood outcomes, e.g. it increases food insecurity.

4.6 Climate change affects nutrition through different pathways

> *Undernutrition is caused by inadequate dietary intake and disease, which stem from insufficient food, poor maternal and child care practices and inadequate access to clean drinking water, safe sanitation and health - all of which are directly affected by climate change.*
>
> SCN statement on the implications of climate change on undernutrition (December 2009)

Maternal and child undernutrition is the underlying cause of 3.5 million deaths each year and 35% of the disease burden in children younger than 5 years (Black et al, 2008). The recent food and economic crises have magnified the challenge of undernutrition (Bloem et al, 2010), which represented already a huge problem. Compelling evidence suggest that climate change magnifies the nutrition crisis and alert on the threats climate change pose on nutrition (IPCC, 2007; IPCC, 2008; IFPRI, 2009; WHO, 2009; IASC Task Force on Climate Change, 2009).

Figure 19 – Impacts and/or threats of climate change impacts on undernutrition



Source: ACF, 2010

Note: the "orange stars" represent the impacts and/or the threats of climate change on undernutrition; these impacts/ threats can be all present simultaneously or not in a defined geographical area of social group.

Research in this field has increased, but is comparatively undeveloped in view of the complexity of the issue, and the potential magnitude and range of consequences. Although the links between climate change and undernutrition have been increasingly examined recently, a comprehensive analysis remains rare, if not inexistent. Most analyses consider isolated pathways such as those of food insecurity, health or water.

Climate change amplifies the risk of undernutrition through different pathways, as illustrated in the figure on the left. The shocks and stressors, prevailing contexts and determinants of undernutrition are all directly affected by climate change. Thus, climate change has/will have negative nutrition-related short-term and long-term consequences, which has knock-on effects on present and future productivity, an important asset.

Quantifying the problem remains a complex exercise, because of the cross-sectoral nature of undernutrition, and only a few studies have attempted the exercise. The International Food Policy Research Institute (IFPRI, 2009) has assessed climate-change effects on food security and human well-being using two indicators: per capita calorie consumption and child malnutrition numbers, stating that: *by 2050, the decline in calorie availability will increase child malnutrition by 20 % relative to a world with no climate change. Climate change will eliminate much of the improvement in child malnourishment levels that would occur with no climate change*. Given the multiple causes of malnutrition, this figure represents a **conservative estimate**, and thus, a **20 % increase in child malnutrition** may be reached much more rapidly, or in others terms, **the expected increase in malnutrition in 2050 could be much more considerable**.

4.7 The 2 streams of climate change impacts on vulnerable populations and undernutrition

It is now acknowledged by both climate scientists and humanitarian practitioners alike that the consequences of **climate change will result in human impacts along two streams** – one that results in a greater frequency, intensity, and unpredictability of extreme events or **small, fast risk processes**, and one that will result in large, **slow-onset processes** that will impact human vulnerability at an incremental rate through diminished livelihood, food and water insecurity, health and undernutrition (adapted from Feinstein International Centre & al, 2010). Policy-makers and practionners will have to identify at the local level how the two different processes interrelate through forcing and feedbacks to make populations even less able to cope with either (adapted from Feinstein International Centre & al, 2010). A typology of climate change-related hazards/ risks is proposed in the table below; it illustrates these two streams of hazards/ risks.

Table 6 – Typology of climate change-related hazards/ risks

Stream	Hazard/ risk	Occurrence		Examples
		Timescale	Prediction opportunities	
1	**(Very) rapid-onset**	*Very rapid*: suddenly/ a few days *Rapid*: few months/years	*Very rapid*: cannot be predicted far in advance *Rapid*: can generally be predicted	*Very rapid*: Cyclone, flood, wildfire *Rapid*: drought
2	**Slow-onset**	A few years to a few decades	Can be observed & predicted	Changes in rainfall and seasons; sea level rise; degradation of natural resources

In summary

⇒ Climate change magnifies human vulnerabilities and it amplifies the risk of undernutrition by an unprecedented scale through different pathways (food-, water-, care- & health-related)

⇒ Climate change will affect populations along 2 streams: one that involves fast risk processes (e.g. floods/droughts) and one that involves slow risk processes (e.g. changing seasons, degradation of natural resources)

⇒ Adverse effects will be continuously amplified in the future, if nothing is done to address climate change

5 Areas and Populations at Risk

5.1 Definitions of vulnerability and resilience

Before defining vulnerability, it is essential to ask the question: *vulnerability of who or what to what*? In the frame of this report, we focus on the vulnerabilities *of developing countries and their populations respectively to climate change and variability (including extreme events), and their links to hunger and undernutrition*. It is essential to remind that vulnerability represents the focus of an analysis and the starting point of programming. This chapter first presents the concepts as defined in the disaster risk reduction (DRR) and/or climate change adaptation (CCA) literature (refer to the section 6), and than it suggests definitions for ACF. It borrows heavily to UNISDR (2009) and to CARE (2009).

In the CCA literature, **vulnerability** to climate change is *the degree to which a community/ a household are susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity* (adapted from IPCC, 2001 in CARE, 2009).

⇒ *Exposure to climate variation* is primarily a function of geography. For example, coastal communities will have higher exposure to sea level rise and cyclones, while communities in semi-arid areas may be most exposed to drought (CARE, 2009).

⇒ *Sensitivity* is the degree to which the community is affected by climatic stresses. A community dependent on rain-fed agriculture is much more sensitive than one where the main livelihood strategy is labour in a mining facility, for instance (CARE, 2009).

⇒ *Adaptive capacity* is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (IPCC, 2001 in CARE, 2009). One of the most important factors shaping the adaptive capacity of individuals, households and communities is their access to and control over natural, human, social, physical, and financial assets. Access to and control over the resources necessary for adaptation varies within countries, communities and even households. Adaptive capacity can vary over time based on changing conditions, and may differ in relation to particular hazards.

In the DRR literature, vulnerability is defined as *the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard* (UNISDR, 2009). Thus vulnerability is more static (or refers to a "status") and it doesn't integrate the dimension of capacity in its definition.

Resilience is defined as *the ability of a community to resist, absorb, and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity* (adapted from: UNISDR, 2009). Resilience is a familiar concept in the context of disaster risk reduction, and is increasingly being discussed in the realm of climate change adaptation. A resilient community is well-placed to manage hazards to minimize their effects and/or to recover quickly from any negative impacts, resulting in a similar or improved state as compared to before the hazard occurred. There are strong linkages between resilience and adaptive capacity; consequently, resilience also varies greatly for different groups within a community.

The following definitions of vulnerability and resilience are suggested for ACF:

Vulnerability to climate variability and change is the degree to which a community, a household or an individual are susceptible to, or unable to cope with climate-related shocks and stresses, therefore leading to (more) hunger and undernutrition. This status and this lack of capacities to face adverse events originate from various causes, referred to as the **underlying causes of vulnerabilities**.

Resilience of a community, a household or an individual refers to their capacities to resist, absorb, and recover from the effects of climate-related shocks and stresses, in a timely and efficient manner, preserving or restoring their livelihood assets and their food and nutrition security.

5.2 Risk hotspots

Climate change impacts vary from region to region and within regions. There are so far little data sets that aggregate the multiple risks induced by climate change (e.g. disaster risks, land degradation, depletion of water resources, rise in sea level, etc.), and this for two main reasons: (i) specific uncertainties remain in predicting climate change impacts (as presented in section 2.4); and (ii) it is complex to identify a comprehensive set of indicators that reflect the different risks induced by climate change. Thus a practical and commonly encountered way to identify climate change risk hotspots is to consider spatial differentiation in terms of climate-related disaster risks. This practical way is particularly pertinent for humanitarian practionners, used to respond to climate-related crises. We assumed that generally recent climate variability and extreme events generally reflect well disaster risks; in fact, as suggested by CARE & al (2008), the intensity, frequency, duration and extent of weather-related hazards will increase in many parts of the world, but it is unlikely to see significant changes in the location of these hazards. We will successively present in this section (i) climate-related disaster risk hotspots; (ii) orientations in terms of climate change hotspots; and (iii) disaster risk/ undernutrition hotspots.

Climate-related disaster risk hotspots

Disaster risk information exists at global, regional, national and sometimes local levels. The figure below present a global mapping of disaster risks, which originates from the interesting report conducted by CARE, OCHA and Mapplecroft (2009) entitled *Humanitarian Implications of Climate Change – Mapping emerging trends and risk hotspots*. This report identifies the most likely humanitarian risk hotspots for the next 20-30 year period. The authors use Geographical Information Systems (GIS) to map specific hazards associated with climate change – floods, cyclones and droughts – and place them in relation to factors influencing vulnerability. The results identify hotspots of high humanitarian risk under changing climatic conditions (CARE, 2009). Risks hotspots are defined as areas where high human vulnerability coincides with the distribution of climate-related hazards. It is important to note that **these disaster risk hotspots overlap with ACF intervention areas**.

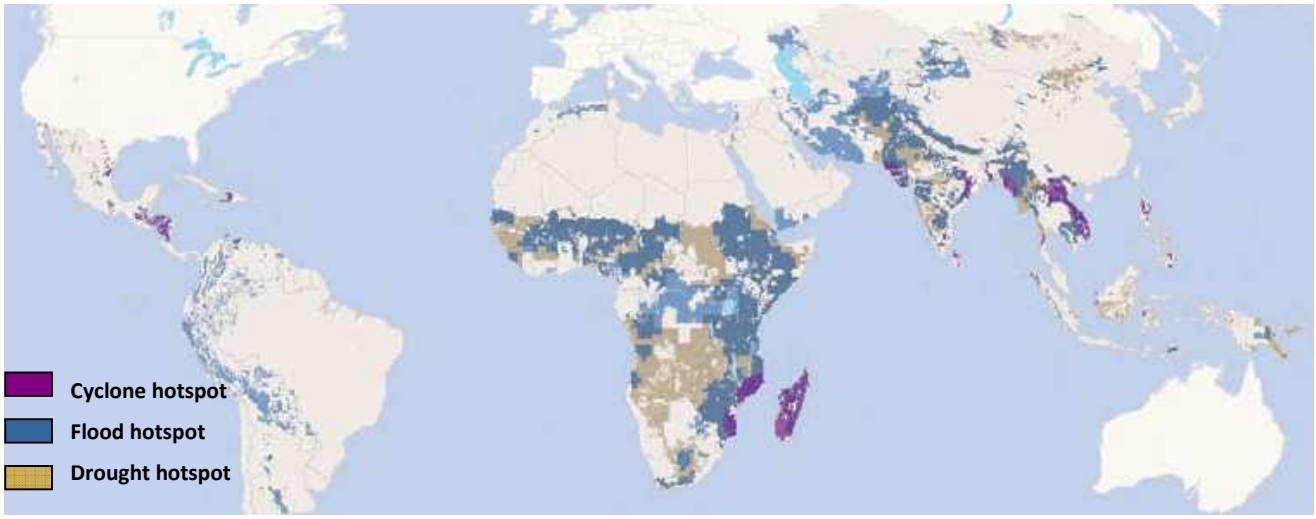
More country and/or local level information on extreme events can be found on the following websites:

⇒ *PreventionWeb/ Country risk profile*: www.preventionweb.net/english/maps/

⇒ *UNDP/ country disaster profile*: http://gridca.grid.unep.ch/undp/

⇒ *EM-DAT* Emergency Events Database *(see "country profile")*: www.EM-DAT.be/

Figure 20 – Mapping emerging trends and disaster risk hotspots in poor countries



Source: CARE, OCHA & Mapplecroft, 2008. *Mapping emerging trends & risk hotspots*

Climate change hotspots

Climate change hotspots can be defined at global, regional and national levels; orientations at local levels are harder to find. These climate change hotspots generally consider only one or a limited number of dominant risks induced by climate change. The **UNFCCC**, in recent negotiations (Copenhagen COP15) consider the following countries as particularly vulnerable to climate change: the small island developing states (or SIDS); countries with low-lying coastal areas; countries with arid and semi-arid areas, forested areas and areas liable to forest decay; countries with areas prone to natural disasters; countries with areas liable to drought and desertification; countries with areas of high urban atmospheric pollution; and countries with areas with fragile ecosystems, including mountainous ecosystems.

Box 5 – Climate change hotspots

The **Global Humanitarian Forum**'s report *The Anatomy of a Silent Crisis* (2009) considers the following regions and countries as the most vulnerable to climate change:

(i) The semi-arid dry land belt countries because of overall vulnerability to droughts from the Sahara/Sahel to the Middle East and Central Asia (particularly Niger, Sudan, Ethiopia, Somalia, Yemen, and Iran, all the way to Western/Northern China);

(ii) Sub-Saharan Africa because of vulnerability to droughts and floods (particularly Kenya, Uganda, Tanzania, Nigeria, Mozambique, and South Africa);

(iii) South and Southeast Asia because of the melting Himalayan ice sheets, droughts, floods and storms (particularly India, Pakistan, Bangladesh, southern and eastern China, Myanmar, Vietnam, Philippines and Indonesia);

(iv) Latin America and parts of the United States because of water shortages and floods (particularly Mexico, Andean countries like Peru and Brazil);

(v) Small island developing states because of sea level rise and cyclones (particularly Comoros islands, Kiribati, Tuvalu, the Maldives and Haiti);

(vi) The Arctic region because of the melting of ice caps.

Some climate change hotspots overlap with ACF intervention areas. More comprehensive and localised data sets on climate change hotspots are currently being developed, and should be available in the future.

More information at regional and country levels can be found on the following websites:

⇒ *UNDP country adaptation profiles*: www.adaptationlearning.net/profiles/

⇒ *Reliefweb/ Climate Change*: www.reliefweb.int/climatechange/

⇒ *UNFCCC/ National Action Programme of Adaptation (refer to section 6)*: http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php

Acute malnutrition/disaster risk hotspots

The identification of **acute malnutrition/ disaster risk hotspots** is particularly pertinent for ACF, as it reflects two main axes of its 2015 strategic programming. The matrix below suggests a typology of world countries based on two parameters, respectively the prevalence of Global Acute Malnutrition (GAM) and the cumulated number of persons recently affected by climate-related disasters (droughts, floods and cyclones) – which reflects disaster risk.

Table 7 – Combined acute malnutrition/ disaster risk hotspots

	GAM		
Cumulated # of persons affected by droughts, floods or cyclones 1990-2009	≥ 15%	10-14%	5-9%
>500 millions	**India**	-	-
100 millions - 500 millions	-	**Bangladesh**	-
50 millions - 100 millions	-	-	Philippines
25 millions - 50 millions	-	**Ethiopia, Pakistan**	Kenya, Iran, Viet Nam
10 millions - 25 millions	**Sudan**		Cambodia, North Korea, Zimbabwe
5 millions - 10 millions	-	Eritrea, Indonesia, Madagascar, Niger, Somalia, Sri Lanka	Zambia
2 millions - 5 millions	Burkina Faso, Lao PDR	Chad, Nepal	Albania, Angola, Burundi, Ghana, Haiti, Myanmar, Tajikistan, Uganda

Sources: Based on EM-DAT: The OFDA/CRED International Disaster Database (disaster caseload) and UNICEF 2000-2006 (GAM).
Notes: (i) We assume that the recent trends (1990-2009) in terms of disasters represents a good window of the current disaster risks; however this presents limitations as climate change is changing disaster patterns; **(ii)** disaster information is unknown for Afghanistan (GAM 5-9%); Bahrain (GAM 5-9%); Congo, Democratic Republic of the (GAM 10-14%); Equatorial Guinea (GAM 5-9%); Sao Tome and Principe (GAM 5-9%); United Arab Emirates (GAM >= 15%); **(iii)** The UNICEF GAM data present its own limitations; in particular, it doesn't reflect the recent evolutions, e.g. the degradation of nutrition situations induced by the recent food and economic shocks; **(iv)**

Four country profiles can be identified, respectively (i) countries with high GAM prevalence (≥10%) and high caseload of persons affected by climate-related disasters (top-left, e.g. India or Ethiopia); (ii) countries with high GAM prevalence (≥10%) and relatively high disaster caseload (down-left, e.g. Indonesia or Niger); (iii) countries with relatively high GAM prevalence (5-9%) and high disaster caseload (top-left; e.g. Philippines or Kenya); and (iv) countries with relatively high GAM prevalence (5-9%) and relatively high disaster caseload (bottom-right; e.g. Haiti or Uganda). **ACF is now present in 18 out of these 31 hotspots countries**.

The **Appendix III** presents the **top 20 countries in terms of SAM caseload** (as highlighted in ACF 2015 draft strategy document), along with the cumulated number of persons affected by droughts, floods or cyclones during the period 1990-2009 in these countries. **Most of the countries with a high caseload of children with SAM are disaster-prone and at risk of climate change**. 10 out of these top 20 countries in terms of SAM caseload are in fact among the top 30 countries in terms of disaster-affected caseload. The top 20 countries in terms of SAM caseload concentrate **31% of the world disaster caseload** (droughts, floods, cyclones) over the period 1990-2009 (1,241 billion compared to about 3,993 billion persons; note that one person can experience several disasters).

5.3 Vulnerable populations

> *It is the poorest that would be the hardest hit, particularly young children. Further, many families with undernourished children do not have the means and capacity to adapt or cope with the multiple threats of climate change* (…).
>
> SCN statement on the implications of climate change on undernutrition (December 2009)

Most populations in developing countries will be affected by climate change – along one or several specific pathway(s) and at a certain degree, but some areas and some groups of populations are more vulnerable than others. **Children** in poor countries are among the most vulnerable to climate change, in particular to the resulting health and nutrition risks. **Women** are often particularly vulnerable to the impacts of climate change due to their limited access to information, resources and services. Other groups such persons living with HIV & AIDS, disabled persons and the elderly may also represent highly vulnerable populations (adapted from CARE, 2009).

The world's **poorest people** are also the most vulnerable to climate change and variability (including extreme events). This is often because they have limited access to assets and limited livelihood options that would facilitate coping and adaptation (adapted from CARE, 2009), e.g. the women; the small-scale farmers, pastoralists or fishermen with limited access to assets or employment opportunities; the urban poor living in slums with limited access to services, etc. The vulnerability of these groups generally originate from various deep-rooted causes referred to as the **underlying causes vulnerabilities** (e.g. discrimination, marginalization, lack of rights over resources, land tenure issues, etc.).

The children, women and poor households living in the **risk hotspots** presented in the section 5.2 are particularly under threats – since they are more exposed to climate-related risks and stresses – and deserve special attention.

In summary

⇒ *Most of the countries with a high caseload of children with SAM are disaster-prone and at risk of climate change; the top 20 countries in terms of SAM caseload concentrate 31% of the world disaster caseload (droughts, floods, cyclones) over the period 1990-2009*

⇒ *The following areas as particularly vulnerable to climate change: small islands and low-lying coastal areas; areas prone to natural disasters; arid and semi-arid areas; areas liable to drought and desertification; areas of high urban atmospheric pollution; and areas with fragile ecosystems, including mountainous ecosystems*

⇒ *The children, the women and the poor are particularly vulnerable to climate change and variability*

6 Responses to Tackle Climate-Related Disasters and Climate Change

6.1 Overview of responses

There are **4 main categories of responses** to face climate-related disasters and climate change, respectively (i) **climate change mitigation** (CCM); (ii) **climate change adaptation** (CCA); (iii) **disaster risk reduction** (DRR); and (iv) **early response to and recovery from climate-related disasters**. Climate change mitigation focuses on the *causes* of climate change, while climate change adaptation, disaster risk reduction and emergency/recovery responses focuses on its *consequences*. It is important to highlight that these 4 types of responses are increasingly integrated; e.g. the DRR approach now represents an essential adaptation axis (refer to the section 6.5); the Disaster Risk Management (DRM) approach combines elements of DRR, CCA and early response and recovery (refer to the section 6.7).

Box 6 – The UNFCCC and the international (lack of) efforts to tackle climate change

The international community (government delegations and observers – who include representatives from multilateral agencies, donors, private sector, civil society and research centres) regularly meets in the frame of the **UNFCCC to shape the responses to tackling climate change** and its effects. Grassroot stakeholders (e.g. community leaders or NGOs), who are on the frontlines of climate change, are increasingly shaping specific agendas negotiated in the frame of the UNFCCC (e.g. adaptation issues). At present, the UNFCCC negotiations focus on (i) **climate change mitigation**; (ii) **climate change adaptation**; (iii) the provision of **financial resources**; (iv) **technology** development and transfer; (v) **capacity-building**; and (vi) **sectoral approaches** (e.g. agriculture, forestry).

The latest important meeting of the UNFCCC was the **15th Conferences of the Parties (COP15)**, which took place in **Copenhagen** in December 2009. Whereas the main objective of this conference was to establish an **ambitious global climate agreement**, two weeks of intense negotiations led to a disappointing outcome, referred to as the **Copenhagen "Accord"**. This unambitious and vague accord is not legally binding, and will be further discussed throughout 2010.

6.2 Climate change mitigation

"Climate change is happening more rapidly than anyone thought possible. Should humankind stop worrying about global warming and instead start panicking? My conclusion is that we are still left with a fair chance to hold the 2°C line, yet the race between climate dynamics and climate policy will be a close one."

H. J. Schellnhuber — Potsdam Institute for Climate Impact Research (PIK); Member of the IPCC

As presented in the section 2, the greenhouse gases are the main drivers of anthropogenic climate change. In order to slow-down climate change, it is therefore essential to control and reduce the concentrations of GHG in the atmosphere. **Climate change mitigation** refers to *human intervention to reduce the sources or enhance the sinks of greenhouse gases* (IPCC, 2007). With unabated emissions, many trends in climate will likely accelerate, leading to an increasing risk of abrupt or irreversible climatic shifts (University of Copenhagen, 2009). Climate change mitigation led to the concepts of "**low-carbon development**", referred as well as "low-carbon

economy" or "low-fossil-fuel economy"; these concepts refers to an economy which has a minimal output of greenhouse gas (GHG) emissions into the biosphere (particularly the CO_2).

The goal of constraining warming to an average global temperature increase of **no more than 2°C** above preindustrial levels represents a growing consensus in policy and scientific circles; however this figure has been recently challenged by another target: 1,5°C. It is often used as a rough guide to the heat we should expect if **CO_2 levels reach 450 ppm** (note that a 1,5°C target relate to CO_2 levels of 350 ppm). From a development perspective, 2°C figure is the line the world cannot afford to cross. It remains as well the most commonly quoted guardrail for avoiding dangerous climate change (refer to section 2.5).

A **2°C warming would, in itself, introduce considerable risk to human populations and natural systems**. Nevertheless, the facts that global average temperature has already risen by about 0.7°C and that greenhouse gas emissions from human activities are still increasing render the achievement of a more ambitious goal very difficult. Immediate and dramatic emission reductions of all greenhouse gases are needed if the 2°C guardrail is to be respected. It will require major shifts in lifestyle, a veritable energy revolution (e.g. developing new low-energy technologies for industry and transport; reducing consumption of energy-intensive products; switching to renewable forms of energy; etc.), and a transformation in how we manage land and forests. And substantial adaptation would still be needed. Coping with climate change will require all the innovation and ingenuity that the human race is capable of.

6.3 Climate change adaptation

> "*Climate change impacts are affecting the poorest groups of people the most, so building resilience through community-based adaptation in vulnerable and poor communities is crucial*."
>
> Saleemul Huq — Senior Fellow, Climate Change, International Institute for Environment and Development, London

Climate change mitigation focuses on the **causes** of climate change, while **climate change adaptation** – the second pillar of response – focuses on its **consequences**. Climate change adaptation was up to recently considered as a secondary axis of response. However adaptation efforts have been increasing recently, as it became more and more obvious that negative impacts of climate change are already with us, while some countries and populations are ill-prepared to face climate change. It is important to mention that climate change adaptation are not stand-alone activities but have to be integrated into projects, plans, policies; in others terms CCA refers to a *multi-sectoral approach* and not to an *isolated sector*.

Definitions

According to the IPCC (2007), adaptation refers to the *adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities*. IPCC distinguished various types of adaptation, including anticipatory, autonomous & planned adaptation:

⇒ *Anticipatory adaptation* is the adaptation that takes place before impacts of climate change are observed (also referred to as proactive adaptation).

⇒ *Autonomous adaptation* is the adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems (also referred to as spontaneous adaptation).

⇒ *Planned adaptation* is the adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.

The following definition of climate change adaptation is suggested for ACF:

Climate change adaptation refers to the actions taken to help communities, households and individuals moderate, cope with, or take advantage of actual or expected changes in climate conditions (adapted from USAID, 2007).

Important trends in terms of adaptation

Adaptation approaches have evolved very rapidly in the recent years, based on experiences, lessons learned and inherent constraints in terms of predictions. Six important evolutions are proposed below:

1. **Increased focus on *existing* climate variability and extremes in order to overcome uncertainties on *future* climate.** As presented in section 2, predictions are limited by uncertainties and they are generally lacking at local levels in less developed countries. This represents obstacles to adaptation (e.g. how will precipitation change in a specific country in Africa, and therefore to what its populations shall adapt, more water or less water?). For this reason, the focus of adaptation has increasingly **shifted from the adaptation to future/ gradual changes to the adaptation** to existing climate variability (e.g. inter-annual variability, seasonal variability and extremes events), which itself would help address the future adverse effects of climate change. In others terms, if adaptive capacities of communities and households are enhanced to facing current climate variability and extremes, than they will be better prepared for to future changes as well.

2. **Mainstreaming the climate dimension into and climate-proofing current development and humanitarian programming and practices.** Development and humanitarian aid remained up to recently relatively disconnected from the climate change agendas, including adaptation. Researchers, policy-makers and practitioners realised that the agendas of traditional aid and of adaptation were converging and that development actions often yield benefits for almost any change in climate (e.g. water reservoirs, safety nets, etc.). **No-regret strategies** are those that bring benefits with or without climate change. They consider adaptation as a co-benefit of development actions; these strategies allow as well addressing uncertainty. "**Climate-proofing**" refers to strategies implemented to make development and humanitarian actions resistant to climate change and variability (including extreme events) – therefore protecting gains made with aid programs.

3. **Increased focus on *existing* vulnerabilities and capacities, rather than on *future* climate change adverse effects**. The main focus of adaptation was originally the current but more especially the *future impacts* of climate change, an approach referred to as "discrete adaptation"; this emphasis on future impacts take place at times when it was not fully realised that climate change impacts were already among us but rather represent a "distant" threats). Current vulnerabilities, capacities and adaptive processes now represent the main focus of adaptation efforts. **Reducing existing vulnerability and building resilience** are considered as essential preconditions to enable people in facing and adapting to climate change.

4. **Disaster risk reduction as essential and "ready-to-use" climate change adaptation measures**. Disaster risk reduction – which has been developed for more than 15 years – has been progressively mainstreamed within the climate change adaptation agenda. It is now considered as a **first line of defence** against climate change. Refer to the section 6.4.

5. **From top-down approaches to community-based adaptation**. Adaptation efforts were traditionally driven by outside experts, through top-down approaches, involving mainly international or national institutions (e.g. National Adaptation Programs of Action). Community-based adaptation (CBA) – which considers the key roles that communities and households have to play at the local levels – is increasingly considered by researchers, policy-makers and practitioners as essential complementary actions to international, national and sub-national initiatives. Refer to the box below.

6. **Climate change mitigation and adaptation efforts are increasingly integrated, but as well potentially in "competition"**. There are several emerging initiatives that aim at bridging mitigation and adaptation, e.g. conservation of carbon in agricultural soils and more sustainable agricultural practices through conservation agriculture, or specific measures to restrict greenhouse gases output that result in benefits to public health. However some recent climate change mitigation initiatives appear to have adverse effects or represent threats on development & adaptation efforts, such as the rapid development of biofuels, which has impacts on world food production).

Box 7 – Adaptation strategies for local impacts

The latest adaptation approaches combine community-based approaches with national adaptation efforts approaches. IFRC & al (2009) suggest the following orientations in terms of adaptation strategies for local impacts:

1. Prioritize adaptation efforts in communities where vulnerabilities are highest and where the need for resilience is greatest.

2. Build projected climate change related trends in today's risk and vulnerability assessment based on current climate variability.

3. Fully integrate adaptation into longer-term national and local sustainable development and poverty reduction strategies.

4. Prioritize the strengthening of existing capacities – among local authorities, civil society organizations, and the private sector – to lay the foundations for the robust management of climate risk and the rapid scaling up of adaptation through community-based risk reduction and effective local governance.

5. Develop robust resource mobilisation mechanisms for adaptation that ensure the flow of resources & support to local actors.

6. Leverage the opportunities in disaster prevention and response, through improved early warning systems, contingency planning and integrated response, to promote effective community-based adaptation and risk reduction.

Illustrations of adaptation actions

The World Resources Institute (WRI, 2007) analyzed 135 examples of adaptation projects, policies, and other initiatives from developing countries. The review found that the range of adaptation activities may be framed as a **continuum of responses to climate change**, from "pure" development activities on the one hand to very explicit adaptation measures on the other (referred to as "discrete adaptation"); see the figure below.

The **National Adaptation Programmes of Action** (or NAPAs) provide interesting illustrations of adaptation programming by national governments. In the frame of the UNFCCC, it has been progressively realised that Least Developed Countries (LDCs) need some urgent support, considering their limited ability to adapt to the adverse effects of climate change. The NAPAs provide a process for LDCs to identify priority activities that respond to their urgent and immediate needs with regard to adaptation to climate change. NAPAs contain a list

of ranked priority adaptation activities and projects, as well as short profiles of each activity or project, designed to facilitate the development of proposals for implementation. These adaptation activities and projects are part of various sectors, respectively; food security; coastal zones/marines ecosystems; early warning systems and disaster management; education/capacity building; energy; health; infrastructure; insurance; terrestrial ecosystems; tourism; and/or water resources. All NAPAs are available on:

http://unfccc.int/cooperation_support/least_developed_countries_portal/napa_project_database/items/4583.php

Figure 21 – The adaptation continuum

At the development end of the spectrum, activities reduce vulnerabilities. Very little attention to specific climate change impacts is paid during these interventions, although they help to buffer households and communities against climate trends or shocks. *Sample activities include efforts to improve livelihoods, women's rights, and even projects that address HIV/AIDS.*	Adaptation activities focus on building robust systems for problem solving. These capacity-building efforts lay the foundation for more targeted actions, and overlap substantially with many institution building and technological approaches familiar to the practitioners. *Examples include the development of robust communications and planning processes, weather monitoring, and natural resource management practices.*	Climate information is incorporated into decisions to reduce negative effects on resources and livelihoods, accommodating the fact that often the effects of climate change are not easily distinguished from the effects of hazards within the historic range of climate variability. *Examples include disaster response planning activities, drought-resistant crops, and efforts to "climate-proof" physical infrastructure.*	Actions focus almost exclusively on addressing impacts associated with climate change, typically targeting climate risks that are clearly outside historic climate variability, and with little bearing on risks that stem from anything other than anthropogenic climate change. *Examples include communities that relocate in response to sea level rise, and responses to glacial melting.*

Source: WRI, 2007

More information on concrete climate adaptation actions is available on the following websites:

⇒ *UNFCCC/ Local coping strategies and adaptation actions*: http://maindb.unfccc.int/public/adaptation/

⇒ *World Resource Institute*: http://projects.wri.org/adaptation-database

⇒ *WikiAdapt/ Climate change adaptation*: http://wikiadapt.org/

6.4 Disaster risk reduction

Both humanitarian and development stakeholders **have implemented disaster risk reduction** policies and practices for more than 15 years, **for both climatic and others hazards**. DRR has recently received a wider attention, as as consequence of the increase in climate-related disasters worldwide and climate change (among others). As explained above, disaster risk reduction represents an **essential approach to face the adverse effects of climate change and variability**, and more specifically the extreme weather events. It is important to mention that disaster risk reduction are not stand-alone activities but have to be integrated into projects, plans, policies; in others terms CCA refers to a *multi-sectoral approach* and not to an *isolated sector*.

Definitions

Traditionally, **disaster risk reduction** refers to *the broad development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout society, through prevention, mitigation and preparedness* (HPN, 2004).

⇒ **Mitigation** refers to any action taken to minimise the extent of a disaster or potential disaster. Mitigation can take place before, during or after a disaster, but the term is most often used to refer to actions against potential disasters. Mitigation measures are both physical or structural (such as flood defences or strengthening buildings) and non-structural (such as training in disaster management, regulating land use and public education) (HPN, 2004). It should be noted that in climate change-related fields, "mitigation" is defined differently; refer to the section 6.2.

⇒ **Preparedness** refers to specific measures taken before disasters strike, usually to forecast or warn against them, take precautions when they threaten and arrange for the appropriate response (such as organising evacuation and stockpiling food supplies). Preparedness falls within the broader field of mitigation (HPN, 2004).

⇒ **Prevention** refers to activities to ensure that the adverse impact of hazards and related disasters is avoided (HPN, 2004) (such as dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones). Very often the complete avoidance of losses is not feasible and the task transforms to that of mitigation; partly for this reason, the terms prevention and mitigation are sometimes used interchangeably in casual use (UNISDR, 2009).

It is important to note that **the scope of disaster risk reduction is evolving rapidly**. A favoured definition and more broadly-acknowledged definition today is provided by the UNISDR (2008), for which DRR *is the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events*.

The following definition of disaster risk reduction is suggested for ACF:

Disaster risk reduction refers to the actions taken to *reduce exposure to and impacts of climatic and others hazards, improve preparedness for adverse events and increase the resilience of vulnerable communities, households and individuals.*

The Hyogo framework for action

The **Hyogo Framework for Action** (HFA) 2005-2015 "*Building the Resilience of Nations and Communities to Disasters*" is an internationally agreed policy framework for disaster risk reduction, which was adopted at the World Conference on Disaster Reduction, Kobe, Hyogo, Japan (2005). It provides a strategic and comprehensive global approach to reducing vulnerabilities to natural hazards (climatic and others hazards, e.g.; earthquakes, tsunamis), and represents a significant reorientation of attention toward the root causes of disaster risks, as an essential part of sustainable development, rather than on disaster response alone (UNISDR, 2009).

The **United Nations International Strategy for Disaster Reduction** (UNISDR) brings together governments, NGOs, UN Agencies, universities and technical institutions, international financial institutions and the private sector to help build capacities for reducing disaster risk and to promote and monitor the implementation of the Hyogo Framework for Action (UNISDR, 2009).

The HFA sets out **five priorities for action** as follows (UNISDR, 2009):

1. **Governance:** Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation, including dedication of adequate resources and the establishment of coordination mechanisms such as a national platform for disaster risk reduction.
2. **Risk identification and early warning:** Identify, assess and monitor disaster risks and enhance early warning, including hazard and vulnerability analysis and early warning systems with outreach to communities.
3. **Knowledge:** Use knowledge, innovation and education to build a culture of safety and resilience at all levels, through awareness-raising, school education, scientific research and information exchange.
4. **Reducing risk factors:** Reduce the underlying risk factors in such areas as natural resource management, socio-economic development, physical planning and construction.
5. **Strengthen disaster preparedness for effective response:** Strengthen disaster preparedness for effective response at all levels, including preparedness planning and strengthening of disaster response capacities.

Illustrations of DRR actions

DRR approach encompasses a **broad range of potential actions**, and it is rapidly expanding. The table below presents some DRR actions in the relation to the HFA.

Table 8 – Illustrations of DRR actions in relation to the HFA

Thematic area	Illustrations of DRR actions
1. Governance	- DRR policy-making, planning and development of legal and regulatory systems - Development of capacities of national and local institutions - Deevelopment of participatory schemes, partnership-building and coordination of DRR stakeholders
2. Risk identification & early warning	- Hazard/risk, vulnerability and capacity assessments - Development of scientific and technical capacities and innovation - Development of early warning systems
3. Knowledge and education	- Public awareness (e.g. through the development and dissemination of information through media and educational channels, the establishment of information centres, networks)

	- Education and training (e.g. training in disaster risk reduction, regulating land use and public education) - Learning and research
4. Reducing risks factors	- Building sustainable livelihoods (e.g. hazard-resistant agricultural practices, livelihood diversification) - Improving health and well-being (e.g. development of health services, WaSH operations) - Strengthening social protection schemes (e.g. safety nets, mutual assistance systems) - Improved access to financial services (e.g. credit and saving schemes) - Risk transfer mechanisms (e.g. insurances, catastrophe bonds, contingent credit facilities) - Environmental & natural resource management (e.g. water management, community-based forestry) - Physical protection; structural and technical measures (e.g. flood defences, hazard-resistant construction, evacuation shelters)
5. Strengthen disaster preparedness for effective response	- Development of organisational capacities and co-ordination - Development of early warning systems (which comprises of 4 elements, respectively knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received) - Development of contingency planning

Source: adapted from Twigg, 2007

Why to invest in DRR?

DRR is a matter of **ethics**: *if it is known that a disaster will strike (again) communities and households, than the stakeholders involved with these communities and households are accountable of doing something for them*. Some argue that not doing reflect a non-assistance to persons in danger.

DRR is a matter of **impacts** on the lives and livelihoods of the communities and households (regularly) exposed to hazards. The table below compares the adverse effects of two rather similar cyclones (Cyclone Sidr and Nargis) respectively on Bangladesh – that considerably invested in DRR – and Myanmar – that didn't invest in DRR at the time of the cyclone. While exposure of these two countries was similar, the consequences were considerably different.

DRR is a matter of **efficiency**. The UN estimate that for each USD invested in DRR, 4-7 USD are saved in the future. Add a comment to insist on life-saving by prevention.

Table 9 – Benefits of investing in DRR

Indicator	**Bangladesh** Cyclone Sidr, November 2007	**Myanmar** Cyclone Nargis, May 2008
DRR?	***With DRR policies and practices***	***Without DRR policies and/or practices***
Cyclone Category	Category 4	Category 3
Tidal Wave (and storm surge)	5 m (up to 6m)	3.5 m (up to 7m)
Wind speed	240 km/hr	255 km/hr
Population evacuated	3 million	None
Deaths	3,406	84,537
Missing	1,001	53,836
Population 'severely' affected	1 million	2.4 million
Cost of damage	US$1.67 billion	US$11 billion
Human Development Index (2007)	140	132
GDP (PPP, 2007)	US$1,400	US$1,900
Population below poverty line (2004)	45%	33%

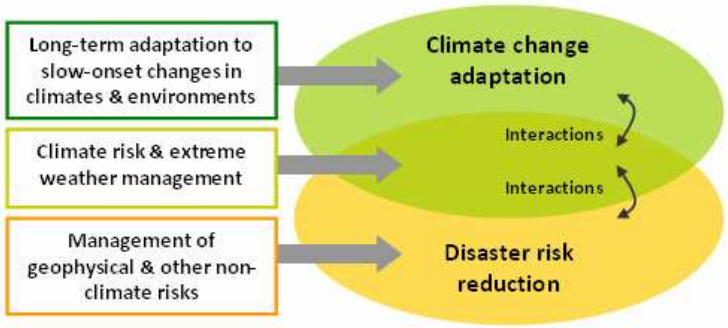
Source: AusAID - Data sources: Cyclone Sidr statistics (World Bank 2008); Cyclone Nargis statistics (USAID, ReliefWeb); Country statistics (UNDP, website). Please note Cyclone Nargis data is current as of 15 May 2008. **Note:** Bangladesh has considerably invested in DRR for the past 15 years; the country represents a pioneer in terms of DRR policies and practices; refer for instance to the Comprehensive Disaster Management Programme of the Bangladesh Government on www.cdmp.org.bd

6.5 Linkages between disaster risk reduction and climate change adaptation

Points of convergence and areas of non-overlap

Disaster risk reduction actions are concerned with an ongoing problem (disasters) and climate change adaptation efforts with an emerging issue (climate change). While these concerns have **different origins and represent different goals**, disaster risk reduction has been progressively mainstreamed within the climate change adaptation agenda. In fact **DRR and CCA overlap a great deal**: they both aim **to reduce climate-related risks and to increase the resilience of communities and households to climate-related hazards** (adapted from UNISDR, 2008). DRR and CCA share another common feature – they are not sectors in themselves but must be **implemented through the policies and practices of other sectors**, in particular, those of agriculture, water resources, health, land use, infrastructure, environment and ecosystems, finance and planning. There are also linkages with other policies, most notably poverty eradication and planning for sustainable development (based on UNISDR, 2009).

Figure 22 – Relationship between CCA and DRR



Source: Adapted from HFP, 2010 and Tearfund and IDS, 2008

At the same time there are **areas of non-overlap**. DRR tackles the risks of non-climatic hazards (like earthquakes), whereas CCA does not. Adaptation also considers the long-term adjustment to *slow-onset changes* in the climate conditions and surrounding environments, including the opportunities that this can provide, whereas DRR is predominantly interested in extremes or *fast risk processes* (based on Tearfund & IDS, 2008 & Feinstein International Center & al, 2010.).

This last area of non-overlap is particularly important. As presented in section 4.7, **climate change affect populations along 2 streams**: one that involve fast risk processes (e.g. floods/droughts) embedded in slow risk processes (e.g. changing seasons, degradation of natural resources). **The integration of DRR and CCA approaches allow policy-makers and practionners to address in a comprehensive manner the (very) rapid-onset hazards as well as the slow-onset hazards**.

The following table highlights the **differences and the recent signs of convergence** between DRR and climate change adaptation measures and approaches (Tearfund, and IDS, 2008).

Table 10 – Summary of differences between DRR and CCA and signs of convergence

Focus	DRR	CCA	Signs of convergence
(Very) rapid-onset hazards	**Relevant to all hazard types (climatic and non-climatic)**	**Relevant to climate-related hazards**	n/a
Slow-onset processes/ hazards	**Not relevant to slow-onset processes/ hazards**	**Relevant to slow-onset processes/ hazards**	DRR increasingly concerned by slow-onset processes
Origin and culture	In humanitarian assistance following a disaster event	In scientific theory	CCA specialists now being recruited from engineering, FS&L, WaSH, health and DRR sectors
Focus	Most concerned with the present – i.e. addressing existing risks	Most concerned with the future – i.e. addressing uncertainty/new risks	DRR increasingly forward-looking; existing climate variability and extremes is an entry point for CCA

Structural measures	Designed for safety levels modelled on current and historical evidence	Designed for safety levels modelled on current and historical evidence and predicted changes	DRR increasingly forward-looking
Traditional focus	Traditional focus on vulnerability reduction	Traditional focus on physical exposure	CCA increasingly focus on existing vulnerabilities and capacities
Application at local level	Practical application at local level, stemming from experience	Theoretical application at local level, stemming from policy agenda	CCA from top-down approaches to community-based adaptation
Tools	Full range of established and developing tools	Limited range of tools under development	Integrated DRR-CCA tools being developed at present
Trend	Incremental development	New and emerging agenda	n/a
Recognition	Political & widespread recognition often quite weak	Political & widespread recognition increasingly strong	DRR is increasingly recognised as essential CCA measures
Funding	Funding streams ad hoc and insufficient	Funding streams sizeable and increasing	DRR community engaging in CCA funding mechanisms

Source: Adapted from Tearfund and IDS, 2008

Illustrations of past and current DRR-CCA programming and actions in ACF

For the past few years, **ACF has developed innovative strategic programming and actions aiming at building the resilience of vulnerable communities and households and at reducing the risks of climatic and non-climatic disasters**. These actions were developed in response to different hazards and risks, either (very) rapid-onset hazards (e.g. cyclones, floods, droughts) or slow-onset hazards (degradation of natural resources). Some of these actions were purposively developed to face impacts and/or threats of climate change. In others cases, climate change was not specifically considered during the strategic programming phase; thus adaptation outcomes rather represent a co-benefit of these innovative actions. The table below illustrates some ACF past/current experiences and best practices that relate to DRR-CCA programming.

Table 11 – Past and current ACF programs related to DRR and CCA

Location	Goal and practices	Hazards under focus
Afghanistan	Development of resilient livelihoods and adaptation of WaSH infrastructure in arid and semi-arid contexts	Droughts, desertification
Bolivia	Disaster preparedness (flood & drought); development of water harvesting schemes; hillside anti-erosion measures; riverside and micro basins reforestation; community mitigation works; promotion of crops adapted to flooding periods	Floods, droughts
Cambodia	Flood disaster preparedness and mitigation (Kampong Cham province); identification and preparation of safe areas for evacuation; capacity development of local Red Cross volunteer networks; stockpiling emergency relief kits	Floods
Chad-Darfur	Prevention of natural resource degradation surrounding IDP camps though fuel efficient cooking stoves	Degradation of natural resources
Ethiopia-Somalia	Drought risk reduction; development of resilient livelihoods and WaSH infrastructure in pastoral contexts	Droughts
Guatemala-Nicaragua	Fighting droughts with rainwater systems; river basin management through WaSH and FS; improvement of the efficiency of vegetable irrigation; disaster preparedness; bioengineering for disaster mitigation	Floods, landslides, droughts
Haiti	Disaster preparation and mitigation	Cyclones, floods, landslides
Indonesia	Integrated local level disaster risk management in urban slum areas	Floods
Kenya	A “arid and marginal lands recovery consortium” formed, for a *sustained access to food in*	Droughts, degradation

	vulnerable rural communities through enhanced resilience to shocks; practices included fuel-efficient stoves; drought tolerant agriculture, support to irrigation groups; water system improvement/ for groundwater storage; DRR training	of natural resources
Mali	GIS-based early warning and surveillance system (EWSSS) in (agro-) pastoral areas; drought mitigation; strengthening livelihoods, sustainable agriculture land use	Droughts
Myanmar	DRR mainstreaming in early recovery operations; community level risk mapping and establishment of village disaster preparedness committees and teams; facilitation of preparedness and response plan and streamlining early warning dissemination system	Cyclones, floods
Niger	*Reduction of chronic vulnerability through strengthening DRR approaches for vulnerable populations*, including livelihoods reinforcement, early warning system; DRR scoping	Droughts
Philippines	Disaster preparation, mitigation and prevention; development of resilient livelihoods through agro-forestry	Cyclones, floods
Zimbabwe	Conservation agriculture; watershed management and rainwater harvesting	Droughts, degradation of natural resources

Source: based on an ACF capitalisation exercise conducted by Andrew Mitchell

6.6 Emergency response to and recovery from climate-related disasters

Important humanitarian crises remain today underadressed – there are more than 1 billions of persons suffer from hunger; only 3-9% of children suffering from severe acute malnutrition are being treated. On top of that, it is now clear that **climate change will further multiply humanitarian crises** and exacerbate vulnerabilities of poor communities and households, therefore leading to more hunger and undernutrition.

As a consequence of climate change, **humanitarian emergencies will further increase** in the coming years at an extent that is difficult to predict, and this, in changing operational contexts (e.g. the ever-diminishing "humanitarian space"). Climate change will probably **overburden an already-overstretched humanitarian system**. Thus the humanitarian system will be asked to address significantly more need with significantly fewer traditional resources, financial, material or human (based on Feinstein International Center & al, 2010). Greater frequency of weather extremes may come to blur distinctions between reconstruction and relief assistance as the time between rescue and recovery is squeezed (Feinstein International Center & al, 2008).

Thus humanitarian stakeholders have to consider **how to respond better to humanitarian emergencies, with fewer resources for a given crisis**. The following essential questions have to be addressed: how to adapt our emergency and recovery responses to make them more efficient, to increase our impacts and to protect the gains and outcomes from these interventions from future disasters? New thinking and practical approaches to humanitarian assistance are emerging to overcome the challenges (the following principles heavily borrow from CARE & al, 2008. *Humanitarian implications of climate change*):

1. Act earlier

Time and time again, action by the global humanitarian community is *too late, too brief, inappropriate and inadequate*. This often results in a cycle of poverty and vulnerability to a disaster that is difficult to break. While risk assessments, emergency preparedness and disaster risk reduction should already be part of longer-term planning, climate change is a wake-up call to ensure this is happening as well as increase the scale and improve the quality of such efforts. It is especially important that the humanitarian community:

• **Increase investment in disaster risk reduction**, and concentrate on reducing vulnerability rather than just reacting to emergencies.

• **Ensure faster and more appropriate responses to disaster**. For instance, invest in early warning systems and be prepared to respond in time to save livelihoods as well as lives; if fragile livelihoods are allowed to erode, people are left more vulnerable to disasters in the future. Refer to the box below.

2. Act wiser

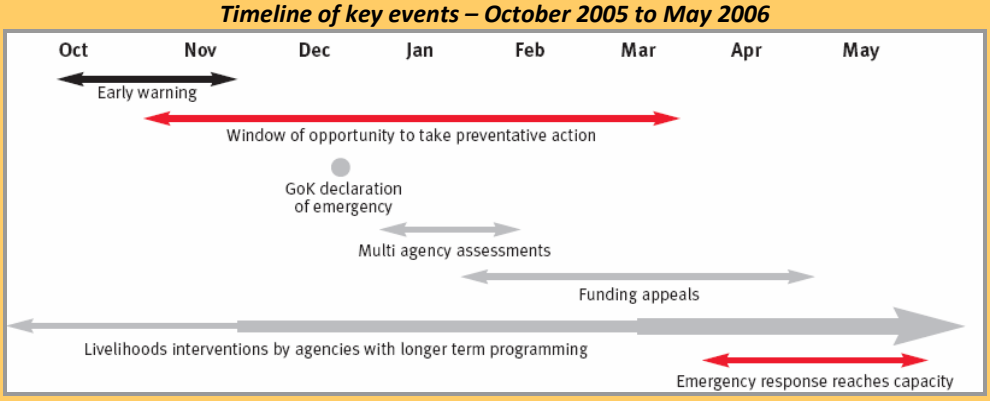
• **Avoid inefficient quick fixes**. For instance food aid, which comprises a large proportion of humanitarian assistance, is often necessary. However, it is frequently provided without considering whether it will exacerbate the situation by distorting local markets – potentially leaving the poor and farmers in a worse situation than before the emergency.

• **Build-back better**. Ensure intelligent recovery from disasters that doesn't undermine development, perpetuate people's vulnerability, and ignore lessons learnt. The aim is to help people create dignified, secure lives for themselves and their families. This will require better risk analysis and communication by humanitarian actors that takes into account obvious hazards and vulnerabilities, but also more complex socioeconomic and cultural factors.

Box 8 – The need for early response: an illustration 2005 drought in the Greater Horn of Africa

ODI (2006) documented **critical gaps in the response to the 2005 drought in the Greater Horn of Africa**, which put into crisis at least 11 million people in Djibouti, Eritrea, Ethiopia, Kenya and Somalia. The impact has been most severe in pastoral areas on the Ethiopia–Kenya–Somalia border, with reports of undernutrition levels far beyond emergency thresholds, livestock losses and the mass migration of pastoralists. International and national **early warning and surveillance systems** documented the progressive deterioration of pastoral livelihoods in the region since 2004, and by November 2005, there were emergency warnings of "pervasive pre-famine conditions", with the potential for widespread famine in pastoral areas. While aid actors with a long-term presence in drought-affected areas moved quickly to modify and scale up their interventions in response to the crisis, it was not until the situation was extremely acute that it attracted meaningful attention. Arguably, the catalyst for a major response across the region was the official declaration by the Kenyan government that the drought was a national disaster. As this happened only on 31 December 2005, **critical time had already been lost**: it is estimated that in some pastoral areas along the Kenya–Somalia border nearly 40% of livestock had already died. It is generally acknowledged that emergency operations did not reach full capacity until March or April 2006, therefore leaving people more vulnerable to future disasters. The "future" peak of disasters occurred as soon as two years later in Kenya, that experienced another major drought event in 2008-2009. **This close succession of disasters will probably be the norm in the future, in the context of climate change.**

Timeline of key events – October 2005 to May 2006



Source: ODI, 2006

3. Follow through

• **Help people get back on their feet**. Few humanitarian interventions address the sustainability of livelihoods after an emergency has been tackled. When disasters hit, the world often responds with generous humanitarian aid (like food, blankets and shelter). Afterwards the emergency occurred and the media leave the place, funding flows continuously decrease for other types of response – such as livestock protection or support for agricultural recovery. This undermines ongoing development efforts and leaves people with few options to go forward once emergency aid ends.

• **Bridge the humanitarian/development divide**. There is growing recognition that current humanitarian practice does not provide sustainable solutions to address human vulnerability, hunger and undernutrition, or at least not at the level desired. In addition, the understanding of the complexity and interrelatedness of future humanitarian challenges is enhanced. Thus researchers, policy-makers and practitioners alike are asking to (further) bridge the humanitarian/ development divide, e.g. to redress the underlying causes of vulnerability such as detrimental policies and poor governance, social discrimination and degraded ecosystems (adapted from CARE & al, 2009 and Feinstein International Centre, 2010).

6.7 Community-based disaster risk management, an integrated approach to respond to disasters and climate change, to reduce risks and to build resilience of vulnerable populations

Preliminary note: *The present section results from various exchanges within and outside ACF, but more particularly with Andrew Mitchell, with whom the definition of strategic responses has been progressively framed during the past months. A disaster risk management policy is now being developed for the ACF Network, thus the approach below might be updated once the policy would have released.*

The traditional disaster risk management approach

Disaster risk management (DRM) – also referred to as "disaster management" – is an approach that finds its origins in the DRR community. The DRM approach consists of the range of activities that normally occur before and after a disaster strikes. It is traditionally divided into three main areas of activity: **disaster risk reduction**; **disaster response**; and **disaster recovery**. While these areas of activity are often referred to as separate "phases" or components of disaster management for administrative funding and programming purposes, in reality they overlap and affect each other.

The DRM approach is often represented along a cycle referred to as the **DRM cycle**; refer to the diagram on the right that shows the breakdown of the disaster management phases into more concrete activities.

Figure 23 – The traditional disaster risk management cycle

Source: The Australian Development Gateway, sa.

Notes: In this cycle, the DRR phase refers to activities comprised between "risk assessment" & "preparedness": the disaster response phase to activities comprised between "warning" & "on-going assistance"; and the disaster recovery phase to activities between "restoration of infrastructural services" & "economic & social recovery".

This diagram works best for very rapid-onset disasters, such as cyclones, floods or earthquakes. It can be used for rapid-onset disasters (e.g. droughts), but it is less reflective of these events, where there is no obviously recognizable single event which triggers the movement into the emergency response stage. In this case, a *declaration of emergency*, based on an appropriate trigger defined in an early warning system, can be used.

A comprehensive community-based disaster risk management approach

The community-based DRM approach presented below represents a comprehensive approach to address disasters and the adverse effects of climate change, to reduce risks and to build resilience of vulnerable communities. **This community-based DRM approach is suggested as the key ACF programming to support climate change adaptation and disaster risk reduction among vulnerable communities.**

This comprehensive DRM approach has 2 specificities. First it integrates all key components or *building blocks* of the responses to disasters and climate change presented in section 6.3 to section 6.6. Second it reflects slow-onset processes and climate change adaptation efforts (more specifically, the long-term adjustments to these changing conditions; refer to the section 6.5). In fact, as presented in the section 4.7, climate change will

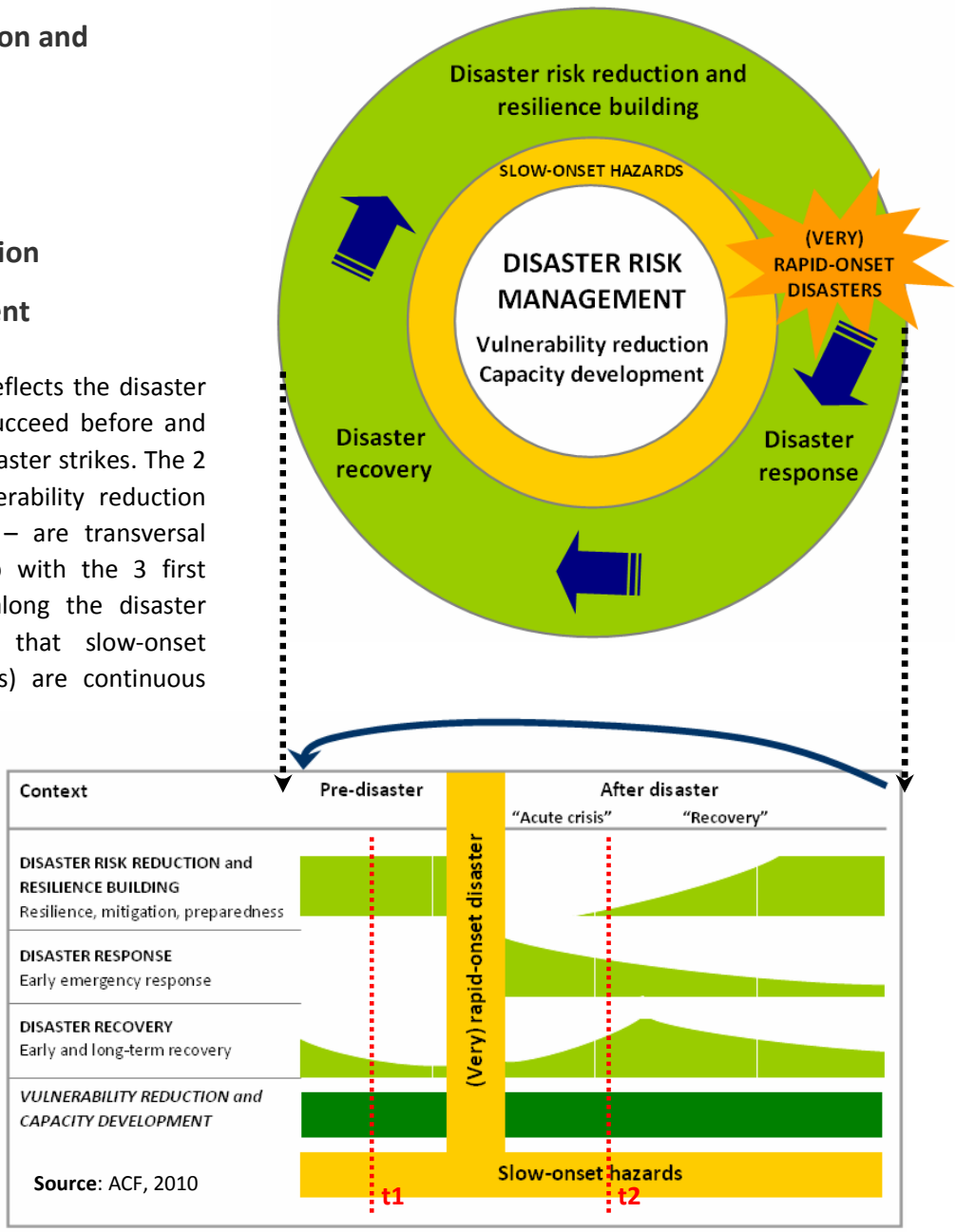
affect populations along 2 streams: one that involves fast risk processes (e.g. droughts) and one that involves slow risk processes (e.g. changing seasons, degradation of natural resources).

The comprehensive DRM approach consists of 5 key building blocks:

1. **Disaster risk reduction and resilience building**
2. **Disaster response**
3. **Disaster recovery**
4. **Vulnerability reduction**
5. **Capacity development**

The 3 first building blocks reflects the disaster management phases that succeed before and after a (very) rapid-onset disaster strikes. The 2 last building blocks – vulnerability reduction and capacity development – are transversal components, which overlap with the 3 first and that are continuous along the disaster management cycle. Note that slow-onset hazard (and others stresses) are continuous throughout the cycle.

Figure 24 – The comprehensive DRM framework



The comprehensive DRM cycle can be "rolled out" as a **contiguum**, as shown in the figure on the right. This contiguum better reflect programming concerns. It illustrates at which extent the different building blocks are mobilised at various times before and after a disaster.

Source: ACF, 2010

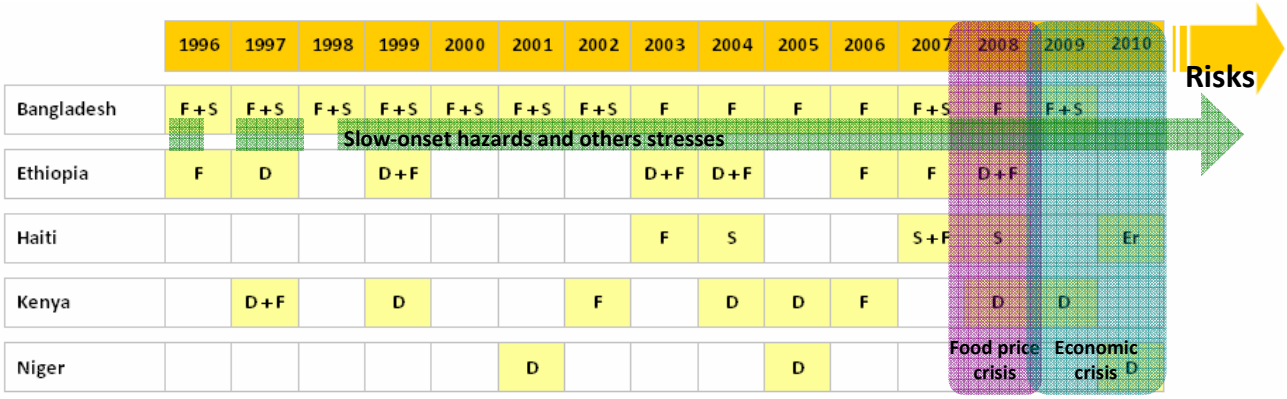
At a specific time t1 (e.g. in drought-prone pastoral lowlands in Ethiopia), programming could include a mix of (i) preparedness activities (e.g. development of an effective surveillance system that can alert about drought hazards; contingency planning), (ii) recovery actions (e.g. diversification of livelihoods for destituted pastoralists); (iii) vulnerability reduction initiatives (e.g. development of water points) and (iv) capacity development actions (e.g. training of community and local leaders on the drought cycle management, liaison of local nutrition experts with DRR experts or government staff). **At a specific time t2** following a disaster (e.g. 2 months after the Haiti earthquake), programming consist mainly of emergency and recovery responses (e.g.

water trucking, food aid and cash-based interventions, mental health), but as well of DRR activities (e.g. contingency planning of humanitarian and government stakeholder in face of the coming cyclone season).

In view of best practices that suggest that DRM approach should be *people-centred* and of the grassroots involvement of ACF, DRM should be a **community-based** approach, which (i) fosters participatory approaches; (ii) combines local/ indigenous knowledge and practices with external initiatives; (iii) supports the local coping and adaptation strategies; (iv) builds the capacities of communities and local institutions, and (v) facilitates a two-way process between communities and external stakeholders, at district and national levels.

It is important to highlight that **the cycle between two (very) rapid-onset disasters vary greatly from a geographical area to another** (e.g. 1 year for Bangladesh to 3-4 years for Ethiopia); refer to the figure below. It is expected that the frequency of disasters will increase as a consequence of climate change, and thus the disaster cycles are expected to get increasingly shorter. Many poor communities already live now in a constant state of recovery, where temporary relief has become a permanent coping strategy. For example, in Afghanistan drought occurs with such frequency that people have little time to recover before another drought hits. Pastoralists in Kenya experienced a severe drought in 2004-05, which was immediately followed by another drought hazard that peaks in 2008-09, leaving almost no time for recovery.

Figure 25 – Timeline of major droughts, floods, storms and earthquakes in five ACF countries of intervention (1996-2010)



Source: Based on EM-DAT: The OFDA/CRED International Disaster Database (disaster caseload). **Legend**: D = drought; F = flood; S = storm; Er = earthquake. **Notes**: "major events" are defined as disaster having affected more than 100,000 persons. Whereas the initial focuses of this comprehensive DRM approach are the climate-related disasters and climate change, **it can be used or adapted for others hazards** – either (very) rapid or slow-onset (e.g. earthquake, peak in food prices, conflict or deteriorating security contexts).

The following definition of community-based disaster risk management is suggested for ACF:

Community-based disaster risk management *refer to the actions taken (i) to reduce risks and build the resilience of vulnerable communities, households and individuals in face of climate and others hazards, (ii) to provide emergency and recovery responses to disaster-affected communities, and (iii) to continuously reduce local vulnerabilities and develop capacities of vulnerable communities, households and individuals, and the institutions that support them.*

The **community-based DRM approach is important for ACF**, because (i) recurrent disasters often results in deepening poverty, hunger and undernutrition, but as well aid dependency (not a "pleasant" situation, at times of overstretched humanitarian system ever-diminishing humanitarian space); (ii) most of the countries having a high caseload of children with severe acute malnutrition are disaster-prone and at-risk of climate change; (iii) it can contribute strengthening ACF strategic programming – in particular, through a more *anticipatory* programming – thus enabling a better support to communities chronically hit by disasters. The table below

illustrates community-based DRM practices that take place *outside the early emergency phase acute crisis*, in others words practices taking place *pre-disaster* or during the "recovery" phase (e.g. in time t1 or t2).

Table 12 – Illustrations of *pre-disaster* DRM practices

Building block	**(Very) rapid-onset hazards** (e.g. drought, flood, storm)	**Slow-onset hazard & continuous stresses** (e.g. changing contexts; degradation of natural resources)
Vulnerability reduction	• **Scale up of ACF nutrition, health, WaSH, FS&L interventions, particularly through integrated approaches** • **Evaluation of nutritional needs, treatment & prevention of acute malnutrition, nutrition education & awareness** • **Nutrition and hunger safety nets** (food or cash transfers, seasonal employment opportunities) • Development of water points & infrastructures (well & borehole drilling, tapping & preserving springs…) • Sanitation, hygiene and health programs (drainage networks, hygiene sessions, mental health, vaccination programs…) • Support to livelihoods (e.g. provision of productive assets & specific services, income generating activities…) • **Inclusion/representation of the poorest, women & marginalized groups in community decision making & planning**	
Disaster risk reduction - Mitigation (or prevention) of the adverse effects of hazard/ disaster	**GENERAL** • **Intensive support to positive coping/ adaptation strategies developed in community** (e.g. local mutual assistance systems) • **"Hazard-proofing" water points & infrastructures** • **Diversification of livelihood strategies** (including "off-farm") **DROUGHT** • **Water technologies for the drylands & (rain)water harvesting** • **Small (supplementary) water-efficient irrigation schemes** • Non-water-based sanitation • Development of community grain & seed-banks • Support to drought-tolerant farming practices (e.g. drought-tolerant & early maturing varieties, drought-resistant breeds…) • Innovative micro-insurance schemes (e.g. weather-based crop & livestock insurance systems) • Slaughter destocking & market-based interventions **FLOOD and/or STORM** • Evacuation plans & shelters for humans & animals • Flood/storm-resistant water infrastructures (e.g. elevation of WaSH infrastructures, building in safe zones…) • Development of drainage systems, reservoirs & small flood protection infrastructure (embankment, dykes…) • Support to flood-tolerant farming practices (e.g. promotion of crops adapted to flooding periods, floating gardens, methods for preserving seed stocks…) • Protection & development of hazard buffers (natural protection belt, mangroves...)	**GENERAL** • **Intensive support to positive coping/ adaptation strategies developed in community** (e.g. traditional rainwater harvesting) • **Diversification of livelihood strategies** **CHANGING RURAL CONTEXTS (seasonality, rainfall…)** • Effective diffusion of seasonal forecasts & other climate information to users and institutions • Community-based meteorological stations • Adaptation of water points and infrastructures (e.g. telescopic drilled borehole, rainwater harvesting…) • Adaptation of local agricultural & pastoral practices (e.g. variety and breed diversification, changing planting times & cropping patterns) **DEGRADATION OF NATURAL RESOURCES** • **Development of effective natural resource monitoring systems** (e.g. groundwater monitoring, pastures …) • **Management, restoration & enrichment of important natural resources** (e.g. soils, pasture enrichment, forests…) • Supporting transitions of unsustainable livelihood strategies (e.g. improvement of the efficiency of irrigation) • Conservation agriculture, agroforestry & sylvopastoralism
Disaster risk reduction - Preparedness	• **Participatory risk, vulnerability & capacity assessment** • **Effective early warning & surveillance system** • **Contingency/response planning in community/country** • **Stockpiling emergency supplies in community/ country**	n/a
Capacity development	• **Involving communities & formal/ informal institutions in the definition & the implementation of DRM plans** • **Development of & support to multi-sectoral community-based DRM committees** • **Awareness rising, training & support of communities & local institutions on DRM** • **Promotion of knowledge-sharing, networking & collaboration to improve good practices** • Contribute in liaising communities with external stakeholders, governmental & non-governmental	• Involving communities & formal/ informal institutions in strategic programming & programme development • Support to community-based committees (e.g. women, water, cooperatives, DRM…) • Awareness rising, training & support of communities & local institutions on nutrition, water management, hygiene, climate change, environmental management… • Community-based natural resource management • Improve knowledge transfer & experience-sharing through adequate media & farmer-to-famer exchange

Note: These illustrations are indicative: only: a thorough participatory risk, vulnerability and capacity remain an essential to strategic programming (a specific program generally addresses several hazards/ risks). **Capacity development** involves learning and various types of training, but also continuous efforts to develop institutions, awareness, and the wider social and cultural enabling environment. **Activities highlighted in bold blue represent suggested priority actions for ACF; refer to the section 7.2 Recommendations.**

7 Conclusion and Recommendations

7.1 Conclusion

Climate change is **not just a distant future threat**, it is the main driver behind rising humanitarian needs and we are seeing its impact now. Climate change acts in conjunction with others factors, and thus is best viewed as a threat multiplier. It is changing the patterns of climate-related hazards and it magnifies the risks of **disasters**. It exacerbates the risk of **undernutrition by an unprecedented scale** through different pathways, respectively food-, water-, care- & health-related. The recent food and economic crises have already **strained the coping strategies** of the poor, decreasing their capacity to withstand climate crises and to face the adverse effects of climate change. As a consequence, already-vulnerable populations worldwide find themselves fast-tracked along the **downward spiral of poverty, livelihood insecurity and undernutrition**.

Adverse effects on vulnerable populations – particularly children, women and poor – will be continuously **amplified in the coming years and decades**, if nothing is done to address both the *causes* and the *consequences* of climate change. Climate change mitigation is important in order to avoid "making things worst". However the human face of climate change and the adaptation efforts should receive the same level of attention by policy- and decision-makers, and it is far to be the case today. This applies with force to nutrition.

There is little doubt that climate change – both in terms of impacts and responses – **will be further reshaping the humanitarian and development agendas and operations** in the coming years; thus climate change should be considered seriously by humanitarian/development decision- and policy-makers and practitioners. Five important implications of climate change on the humanitarian/agenda are presented hereafter:

1. Climate change represents another wake-up call to **put an end to the artificial divide** between the "humanitarian" and the "development" spheres – particularly in view of disaster risk patterns and the threats on natural resources, upon which depend hundred of millions of vulnerable households.

2. Humanitarian emergencies and nutrition crises will further increase in the coming years at an extent that is difficult to predict. Some consider that climate change might overburden an already-overstretched humanitarian system.

3. Climate change demands **more *anticipatory* strategic programming**, and an efficient use of resources. Community-based disaster risk management represents a pertinent approach to address the adverse effects of both disasters and climate change, to reduce risks and to build resilience of vulnerable populations.

4. Climate change responses – both mitigation and adaptation – **require the mobilisation of considerable financial resources**; this could have adverse effects on traditional aid resources. Recent trends suggest that climate change-related mechanisms are recycled from Official Development Aid (ODA) funding, whereas they should be *additional* to ODA; these measures can exacerbate the lack of resources dedicated to address the global hunger and nutrition crises. Thus it is important to pursue strategic thinking, planning and advocacy at global and local levels in order to address these trends.

5. Specific climate change mitigation measures can have adverse affects on the nutrition, food and livelihood security of vulnerable people (e.g. some bio-energy programs or others land-based mitigation measures). These trends should be closely monitored by the humanitarian/ development community.

Urgent actions are required to significantly reduce hunger and undernutrition in the coming years and to ensure nutrition security under a changing climate. All ACF countries and sectors of intervention are subject to adverse effects and under threat of climate change. Thus it is important that ACF sustains and scales up its efforts in addressing climate crises.

7.2 Recommendations to ACF

> *If you want an analogy to guide your thinking, imagine your organization as an elephant: a big, powerful lumbering beast, very good at charging in a straight line. Now imagine teaching your elephant to dance, to be nimble, to adapt to the ever changing environment, to be ever listening to, and for, the changing context of service. That is the humanitarian agency of the future, the agency best able to cope with the complexity and context of the consequences of climate change and globalization*.
>
> Peter Walker (2008)

Doing more of the same, and better, and doing new things

***Preliminary note**. These recommendations results from exchanges with various collaborators in and outside ACF, in particular (i) exchanges with Andrew, the members of DRR-CCA working group and other ACF staff, (ii) exchanges that took place during the drafting stage of an external article (publication forthcoming in SCN newsletter); and (iii) exchanges with Charlotte Dufour (nutrition, food security and livelihood consultant) and experts from others institutions (particularly IDS and Tearfund). Thanks to these various persons.*

1. Scale up coverage of and increase access to interventions to treat acute malnutrition, especially at community level and where possible mainstreamed through existing national healthcare system.

2. Scale up comprehensive and multi-sector nutrition programming to face disasters and climate change, which (i) fosters participatory approaches; (ii) combines local/ indigenous knowledge and practices with external initiatives; (iii) supports the local coping and adaptation strategies; (iv) is based on local resources; and (v) builds the capacities of communities and local institutions. Expand nutrition interventions that successfully and sustainably address the immediate and underlying causes of undernutrition and develop populations' resilience to the growing impacts of climate change, e.g. hunger safety nets, nutrition education and counselling, water and sanitation, small-scale agricultural development, and income generation.

3. Mainstream community-based disaster risk management in ACF policies, strategies and operations and scale up disaster risk reduction – which require *anticipatory* programming in complement to a more traditional *reactive* programming – through risk mitigation, preparedness and capacity development. Priority actions are suggested in the table below – they can be implemented *before* and *after* a disaster occurs (e.g. during recovery "phase").

PRIORITY RISK MITIGATION ACTIONS	• Intensive support to positive coping/ adaptation strategies developed in community • Hazard-proofing water infrastructures and development of dryland water technologies • Small (supplementary) irrigation schemes • Diversification of livelihood strategies (particularly "off-farm" livelihood strategies) • Improvement of natural resource management and effective monitoring of resources
PRIORITY PREPAREDNESS ACTIONS	• Participatory risk, vulnerability & capacity assessment • Development of effective early warning & surveillance system • Contingency/response planning & stockpiling emergency supplies in community/ country
PRIORITY CAPACITY DEVELOPMENT ACTIONS	• Involving communities & local institutions in the definition & implementation of DRM plans • Development of & support to multi-sectoral community-based DRM committees • Awareness rising, training & support of communities & institutions on DRM/ climate change • Promotion of knowledge-sharing, networking & collaboration to improve good practices

4. Prioritise efforts in disaster-prone countries presenting a high SAM caseload and/or prevalence, e.g. Afghanistan, Bangladesh, Burkina Faso, Burundi, Chad, Ethiopia, Haiti, India, Indonesia, Kenya, Pakistan, Sudan, Mali, Myanmar, Niger, Philippines, Uganda and Zimbabwe. Target the most vulnerable households and individuals in communities where the need for resilience is greatest and target. Ensure participatory approaches and the inclusion and representation of the poorest, women & marginalized groups in community decision making & planning.

5. Build ACF rapid response and disaster risk reduction capacities, in particular (i) build the capacities of ACF staff and partners on comprehensive nutrition causal analysis & nutrition planning, DRM, DRR and adaptation; (ii) further enhance ACF global and regional contingency planning mechanisms; (iii) build additional partnerships with key stakeholders in the fields of disaster risk management, DRR and adaptation, at local, regional and global levels; and (iv) target sources of and lobbying donors for more long-term funding (e.g. from 3-4 years), in order to enable consistent resilience building operations.

6. Build further evidence on the links between climate factors and undernutrition and on projected effects, along with a knowledge base to inform future programming on climate change and nutrition – including in conflict-affected contexts – in partnership with prominent research stakeholders.

7. Conduct advocacy at international, regional and national levels aiming at fostering synergies between the climate change, food security and nutrition agendas, and at moderating harm that the climate change agendas and actions could have on the undernutrition issues. In particular, link community experiences and testimonies to the multilateral debate.

8. Explore ways to make ACF operations more climate and environmentally-friendly, e.g. by promoting good environmental practices (such as water-efficient techniques), by integrating climate change mitigation with specific responses (such as conservation agriculture) and by reducing carbon footprints of operations.

Sources of information

ACF, 2010. *The threats of climate change on undernutrition*
ACF & IDS, 2008. *Seasons of Hunger*
ACF, IDS, Tearfund & al, 2010. *Changing climate, changing lives*
ADB, 2009. *Climate change and migration in Asia & the Pacific*
Black & 2008. *Maternal and child undernutrition - Global and regional exposures and health consequences*
Bloem & al, 2010. *Castel Gandolfo Workshop: An Introduction to the Impact of Climate Change, the Economic Crisis, and the Increase in the Food Prices on Malnutrition*
CARE, 2009. *Climate Vulnerability and Capacity Analysis*
CARE, 2009. *In Search of Shelter - Mapping the Effects of Climate Change on Human Migration and Displacement*
CARE, OCHA & Mapplecroft, 2008. *Mapping emerging trends & risk hotspots*
CCD, 2009. *Closing the gaps: Disaster risk reduction and adaptation to climate change in developing countries*
Chambers R and Conway G, 1992. *Sustainable rural livelihoods: practical concepts for the 21st century*
CILSS, FAO & al. *Atlas on regional integration in West Africa*
Crisis Group, 2007. *Climate and conflict*
DFID, 1999. *Sustainable Livelihoods Guidance Sheets: Introduction*
DRC, 2008. *Migration and Climate Change*
FAO, 2006. *The state of food insecurity in the world 2006*
FAO, 2008. *Climate change, water & food insecurity*
FAO, 2009. *The state of food insecurity in the world 2009*
Feinstein International Center & al, 2008. *The humanitarian costs of climate change*
Feinstein International Center & al, 2010. *Humanitarian Horizons - A Practitioners' Guide to the Future*
Fritze & al, 2008. *Hope, despair and transformation*
GermanWatch & Brot für die Welt., 2008. *Climate change, food security and the right to adequate food*
Global Humanitarian Forum, 2009. *The Anatomy of a Silent Crisis*
IASC & OCHA, 2008. *Climate Change, Migration and Displacement - Who will be affected*
IASC Task Force on Climate Change, 2009. *Climate change, food security and hunger*
IASC & UNISDR, 2008. *DRR Strategies and Risk Management Practices: Critical Elements for Adaptation to CC*
IDS & TEARFUND, 2006. *Adapting to climate change*
IFPRI & FAO, 2008. *Impact of CC & bioenergy on nutrition*
IFPRI, 2009. *Impact on Agriculture and Costs of Adaptation*
IFRC, 2007. *Climate guide*
IFRC, 2009. *Coping with crisis: Psychosocial support & CC*
IFRC, 2009. *World Disaster Report*
IFRC & al, 2009. *CCA strategies for local impacts*
International Alert, 2007. *A climate of conflict*
IOM, 2009. *Migration, climate change briefing*
IPCC, 2007. *Climate Change 2007 Synthesis Report,*
IPCC, 2007. *AR4-WG1, AR4-WG2, AR4-WG3 and glossaries*
IPCC, 2008. *Climate change & water*
Lancet & UCL, 2009. *Managing the health effects of CC*
MDM, 2008. *CC: un nouveau contexte pour les OSI*
MIT, 2009. *Revised MIT climate model sounds alarm*
NRC, 2008. *Future floods of refugees*

OCHA & UNISDR, 2008. *Disaster Preparedness for Effective Response - Hyogo framework*
OCHA, WFP & IFRC, 2009. *Addressing the humanitarian challenges of climate change*
ODI, 2006. *Critical gaps in the response to the droughts in the Greater Horn*
Oxfam International, 2007. *Climate Alarm Disasters increase as climate change bites*
Oxfam, 2009. *Suffering the Science*
Oxfam, 2009. *The Right to Survive*
Oxfam, 2009. *What happened to the seasons?*
Panos, 2008. *Introducing climate change*
Practical Action, 2009. *Community-Based Adaptation*
Save The Children, 2008. *In the Face of Disaster*
Save The Children, 2009. *Feeling the heat*
Standing Committee on Nutrition, 2009. *Implications of climate change on undernutrition – Statement*
Stern, 2006. *Stern Review, The Economics of Climate Change*
Tearfund and IDS, 2008. *Linking climate change adaptation and disaster risk reduction*
The Copenhagen Diagnosis, 2009. *Updating the world on the latest climate science*
Twigg, 2004. *Mitigation and preparedness in development & emergency programming*
Twigg, 2007. *Characteristics of a disaster resilient community*
UNDP, 2007. *Human development report 2007-08*
UNEP, 2009. *Climate Change Sciences Compendium 2009*
UNEP, 2009. *Climate In Peril, a popular guide to the latest IPCC report*
UNEP, 2009. *The environmental food crises*
UN Habitat, 2008. *Drowned and dangerous - Cities and climate change*
UNISDR, 2005. *Hyogo Framework for Action 2005-2015*
UNISDR, 2007. *Building disaster-resilient communities, good practices & lessons learned*
UNISDR, 2008. *Climate change and disaster risk reduction*
UNISDR, 2009. *Adaptation to climate change by reducing disaster risks - country practices and lessons*
UNISDR, 2009. *Global Assessment Report on Disaster Risk Reduction*
UNISDR, 2009. *Hydro-climatic Disasters in Water Resources Management*
UNISDR, 2009. *UNISDR Terminology on Disaster Risk Reduction*
University of Copenhagen, 2009. *Global Risks Challenges & Decisions*
USAID, 2007. *Adapting to climate variability and change*
USAID, 2009. *Adapting to coastal climate change*
Walker, 2008. *Complexity and Context as Determinants of the Future*
WFP, 2009. *CC & hunger: Responding to the challenge*
WFP, 2009. *Emergency food security assessment handbook*
WHO, 2009. *Protecting health from climate change*
World Bank, 2008. *Building resilient communities*
World Bank, 2009. *World development report 2010*
WRI, 2007. *Weathering the storm*

Appendix I – Acronyms and Abbreviations

ACF	Action Contre la Faim International
AR4/AR5	Refer to the Fourth/ Fifth Assessment reports of the IPCC (2007 and 2013-14)
CBA	Community-Based Adaptation
CC	Climate Change
CCA	Climate Change Adaptation
CCD	Commission on Climate Change and Development
CCM	Climate Change Mitigation
COP	Conference of the Parties (in the frame of the UNFCCC)
CRED	Centre for Research on the Epidemiology of Disasters
DALYs	Disability Adjusted Life Years
DFID	UK Department for International Development
DRM	Disaster Risk Management
DRMC	Disaster Risk Management Cycle
DRR	Disaster Risk Reduction
EM-DAT	Emergency Events Database
ENSO	El Niño-Southern Oscillation phenomenon
FAO	Food and Agriculture Organizations of the United Nations
FSL	Food Security and Livelihoods
GAM	Global Acute Malnutrition
GHG	Greenhouse Gases
IDS	Institute of Development Studies
IFPRI	International Food Policy Research Institute
IPCC	Intergovernmental Panel on Climate Change
HFA	Hyogo Framework for Action 2005-2015
IFRC	International Federation of Red Cross and Red Crescent Societies
LDC	Least Develop Countries
LECZ	Low Elevation Coastal Zone
NAPA	National Adaptation Programmes of Action
Ppm	part per million
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
SAM	Severe Acute Malnutrition
SCN	Standing Committee on Nutrition
SRES	Refer to the 2000 *Special Report on Emissions Scenarios* of the IPCC
SIDS	Small Island Developing States
UN	United Nations
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction
USAID	United States Agency for International Development
WaSH	Water, Sanitation and Hygiene
WFP	World Food Program
WHO	World Health Organization
WMO	World Meteorological Organization

Appendix II – Glossary

Adaptive capacity: the ability of a system to adjust to climate change and variability, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. ***Note***: by extension, adaptive capacity can apply to non-climate changes (the ability of a system to adjust to changes, […]).

Capacity: Combination of all the strengths, attributes and resources available within a community or institution that can be used to achieve agreed goals.

Capacity development (as used in the community-based DRM approach): The process by which people, communities and local institutions stimulate and develop their capacities over time to achieve goals, including through the enhancement of participation, awareness, knowledge, skills, partnerships and enabling environment. ***Note***: The term "capacity development" traditionally also encompasses the efforts to develop others resources, e.g. financial resources; however in the frame of the community-based DRM approach, it was preferred to restrict its scope (other resource development is considered as part of "vulnerability reduction" measures).

Coping and adaptation strategies: strategies implemented in face of shocks and stresses; coping strategies are generally short-term strategies, motivated by a crisis and oriented towards survival, and adaptation strategies represent strategies oriented towards longer-term livelihood security. ***Note***: coping and adaptation may be seen as part of a continuum of livelihood responses.

Coping capacity: capacity to face and manage adverse conditions, emergencies or disasters.

Climate: Overall long-term characteristics of the weather experienced at a place; the climate therefore can be thought of as a long-term summary of weather conditions, taking account of the average conditions as well as the variability of these conditions.

Climate change adaptation: refers to the actions taken to help communities, households and individuals moderate, cope with, or take advantage of actual or expected changes in climate conditions. Note: community-based disaster risk management – which combines disaster risk reduction, emergency & recovery responses, resilience building, vulnerability reduction and capacity development components is suggested as the key ACF climate change adaptation programming.

Climate change mitigation: refers to human intervention to reduce the sources or enhance the sinks of greenhouse gases. ***Note***: this mitigation is different from the term "mitigation" used in disaster risk reduction community.

Climate variability: The fluctuations that occur from year to year, and the statistics of extreme conditions such as severe storms or unusually hot seasons.

Disaster: a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. ***Note***: Disasters are often described as a result of the combination of (i) the exposure to a hazard; (ii) the conditions of vulnerability that are present; and (iii) insufficient capacity or measures to reduce or cope with the potential negative consequences.

Disaster risk management, community-based: refers to the actions taken (i) to reduce risks and build the resilience of vulnerable communities, households and individuals in face of climate and others hazards, (ii) to provide emergency and recovery responses to disaster-affected communities, and (iii) to continuously reduce local vulnerabilities and develop capacities of vulnerable communities, households and individuals, and the institutions that support them.

Disaster risk reduction: refers to the actions taken to reduce exposure to and impacts of climatic and others hazards, improve preparedness for adverse events and increase the resilience of vulnerable communities, households and individuals.

Disaster response: refers to the provision of assistance or intervention during or immediately after a disaster to meet the needs of those affected. ***Note***: It is generally immediate and short-term.

Disaster recovery: refers to the decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk. ***Note***: Recovery affords an opportunity to develop and apply disaster risk reduction measures.

Exposure: People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. ***Note***: by extension, the term "hazard" can also be used for long-term trends, reflected in the hazard typology hereafter:

Very-rapid onset hazards refer to hazards that occur suddenly and that cannot be predicted long in advance (e.g. cyclone).

Rapid-onset hazards refer to hazards that develop throughout a limited period of time (a few months/ years), and that can generally be predicted (e.g. drought).

Slow-onset hazards refer to hazards that develop throughout a long period of time (a few years to a few decades), and that can generally be continuously observed and predicted (e.g. degradation of natural resources).

Resilience: refers to the capacities of a community, household or individual to resist, absorb, and recover from the effects of climate-related shocks and stresses, in a timely and efficient manner, preserving or restoring their livelihood assets and their food and nutrition security. ***Note***: by extension, resilience can apply to non-climate shocks and stresses.

Risk: The combination of the probability of an event and its negative consequences.

Seasonality: refers as periodic fluctuations in the climate related to seasons of the year and to the changing availability of resources according to the different seasons

Shocks and stresses: pressures that fundamentally affect people's livelihoods, over which they have limited or no control; in the livelihood literature, they traditionally consist of shocks, negative trends and seasonality. ***Note***: the term "hazard" in the disaster risk reduction community traditionally refer to the term "shock" as used in the livelihood community; however by extension the term "hazard" applies to shock, seasonal stresses and negative trends (refers to the definition of hazard above).

Vulnerability (as used in the community-based DRM): the degree to which a community, a household or an individual are susceptible to hunger and/or undernutrition, combined with the degree to which they are susceptible to, or unable to cope with shocks and stresses, therefore leading to more hunger and undernutrition.

Vulnerability to climate variability and change: degree to which a community, a household or an individual are susceptible to, or unable to cope with climate-related shocks and stresses, therefore leading to (more) hunger and undernutrition.

Weather: the set of meteorological conditions (wind, rain, snow, sunshine, temperature …) at a particular time and place.

Appendix III – SAM hotspots and disaster trends

The table below presents the top 20 countries in terms of SAM caseload, along with the cumulated number of persons affected by droughts, floods or cyclones during the period 1990-2009 in these countries; this second number reflects the risks of climate-related disasters (droughts, floods, cyclones).

Most of the countries with a high caseload of children with SAM are disaster-prone and at risk of climate change. 10 out of these top 20 countries in terms of SAM caseload are in fact among the top 30 countries in terms of disaster-affected caseload.

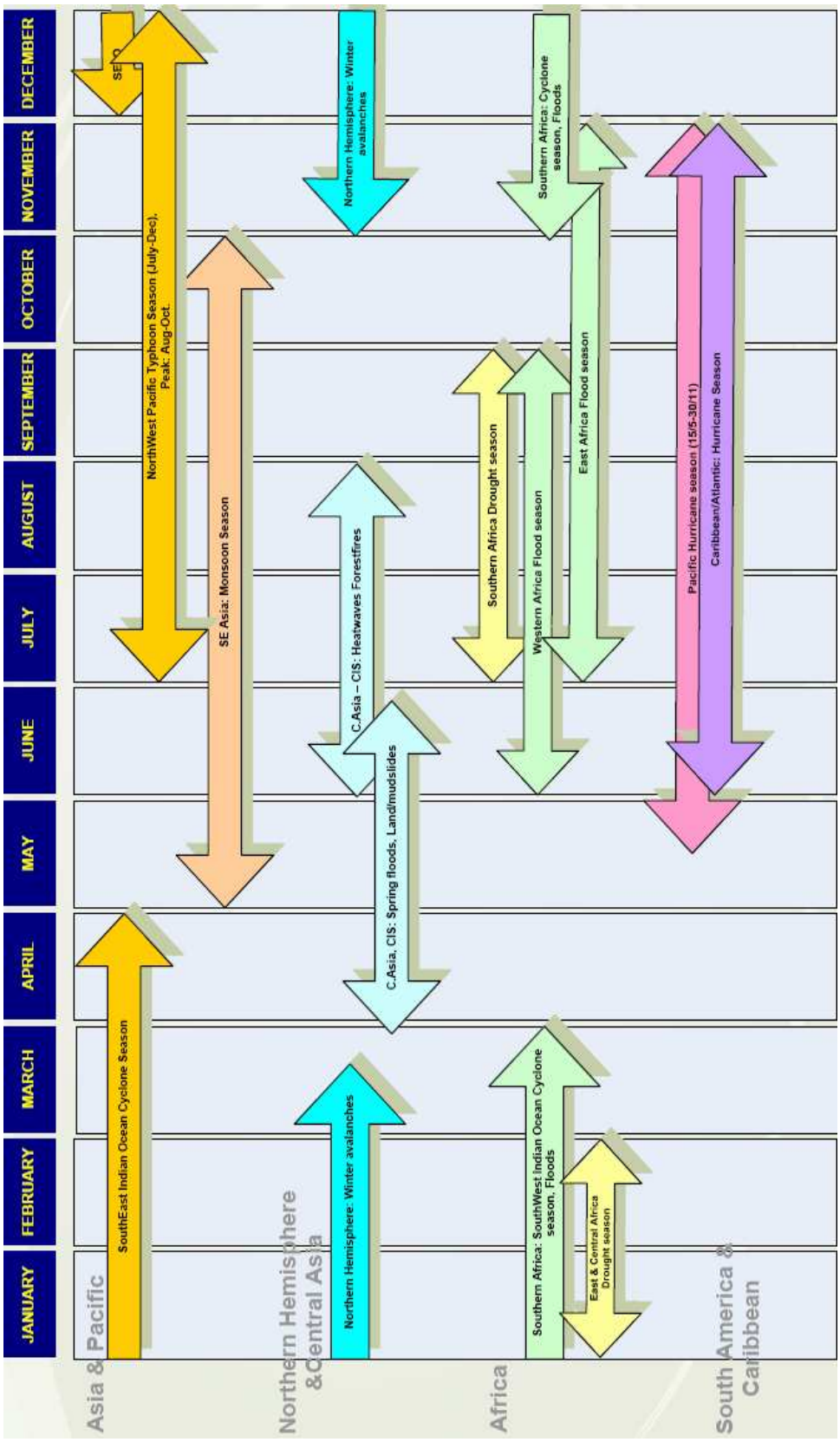
The top 20 countries in terms of SAM caseload concentrate 31% of the world disaster caseload (droughts, floods, cyclones) over the period 1990-2009 (1,241 billion compared to about 3,993 billion persons; note that one person can experience several disasters).

It is important to note that a majority of these top 20 countries in terms of SAM caseload currently experience localised conflicts or open war; thus the importance in the future to adapt DRM to conflict situations.

#	SAM			Climate-related disaster trends		Conflict
	20 first countries ranked based on the # of children with SAM	% SAM	Number of children with SAM	Cumulated # of persons affected by droughts, floods or cyclones 1990-2009	Country rank based on the cumulated # of affected persons 1990-2009	
1	India	7.0	8,882,580	914,165,908	**2**	+
2	*DRC*	11.9	1,373,498	*Unknown*	*Unknown*	+
3	Nigeria	4.8	1,159,296	1,362,521	64	(+)
4	Pakistan	5.9	1,114,274	31,512,276	**10**	+
5	Bangladesh	3.5	662,060	153,760,721	**3**	
6	Ethiopia	3.8	503,082	36,057,056	**9**	+
7	Indonesia	2.1	456,834	6,816,572	**28**	
8	Sudan	7.2	392,256	14,488,623	**17**	+
9	Burkina Faso	9.7	246,477	3,078,493	46	
10	Yemen	6.8	241,468	349,123	93	+
11	Niger	6.2	163,060	8,599,732	**22**	+
12	Egypt	1.8	153,810	165,100	111	
13	Kenya	2.4	143,184	40,217,097	**6**	(+)
14	*Afghanistan*	3.0	139,680	*Unknown*	*Unknown*	+
15	Cambodia	7.5	126,075	16,261,705	**15**	
16	Myanmar	2.9	121,104	3,384,454	44	+
17	Iraq	2.4	101,232	71,510	126	+
18	Nepal	2.8	101,108	3,016,559	47	
19	Madagascar	3.0	92,820	7,151,793	**26**	
20	Mali	4.2	91,602	1,486,277	63	+

Sources: **(i)** Lancet series 2008, MICS 2006, DHS 2004, 2006 in ACF 2015 strategy (for the SAM-related information); **(ii)** EM-DAT: The OFDA/CRED International Disaster Database (for the climate-related disaster trends); **(iii)** based on the International Crisis Group (for the conflicts).

Appendix IV – Seasonal climate-related hazards in most disaster-prone regions



Source : OCHA, 2008

Appendix V – Essential resources and library

Essential publications

Feinstein International Centre & al, 2010. *Humanitarian Horizons: A Practitioner's Guide to the Future*. Available at: https://wikis.uit.tufts.edu/confluence/display/FIC/Humanitarian+Horizons+--+A+Practitioners%27+Guide+to+the+Future

Walker, 2008. *Complexity and Context as Determinants of the Future*. Available at: https://wikis.uit.tufts.edu/confluence/display/FIC/Complexity+and+Context+as+the+Determinants+of+the+Future

Essential websites

PreventionWeb: http://preventionweb.net/english

Reliefweb Humanitarian implications of climate change: www.reliefweb.int/rw/hlp.nsf/db900ByKey/climate_change?OpenDocument

HEWS/ Humanitarian Early Warning Service: www.hewsweb.org/home_page/default.asp

IFRC climate centre: www.climatecentre.org

EM-DAT International disaster database: www.EM-DAT.be

Nutrition and health

Lancet & UCL, 2009. *Managing the health effects of climate change*. Available at: www.ucl.ac.uk/global-health/ucl-lancet-climate-change.pdf

SCN, 2009. *Implications of climate change on undernutrition*. Available at: www.unscn.org/files/Statements/SCN_statement_climate_change_final.pdf

SCN, 2010. *Newsletter #38 – Climate change and nutrition* (forthcoming). Available at: www.unscn.org

WHO, 2009. *Protecting health from climate change: Connecting science, policy and people*. Available at: www.who.int/globalchange/publications/reports/9789241598880/en/index.html

Water, sanitation and hygiene

CPWC/World Water Council/IUCN/IWA, 2009. *Water and Climate Change Adaptation Series*. Available at: www.waterandclimate.org/index.php?id=5thWorldWaterForumpublications810

DANIDA, sa. *Water technologies for the drylands*. Available upon request

DWC, 2008. *Climate changes the water rules*. Available at: www.worldwaterweek.org/documents/WWW_PDF/Resources/2009_WnC/Climate_changes_the_water_rules.pdf

IPCC, 2008. *Climate change & water*. Available at: www.ipcc.ch/publications_and_data/publications_and_data_technical_papers_climate_change_and_water.htm

UNEP, 2009. *Rainwater harvesting*. Available at: www.unepdhi.org/documents/Rainwater%20Harvesting%20090310b.pdf

UNISDR, 2009. *Hydro-climatic Disasters in Water Resources Management*. Available at: www.preventionweb.net/english/professional/publications/v.php?id=10358

Food security and livelihoods

Cordaid, 2004. *Drought cycle management*. Available upon request

IASC, 2009. *Climate change food security and hunger*. Available at: http://www.reliefweb.int/rw/RWFiles2009.nsf/FilesByRWDocUnidFilename/SNAA-7XM3WP-full_report.pdf/$File/full_report.pdf

IFRC, 2008. *Early Warning Early Action*. Available at: www.climatecentre.org/site/early-warning-early-action

The Green Belt Movement, 2009. *Responding to climate change from the grassroots*. Available at: http://greenbeltmovement.org/downloads/2009_climate_change_report_short_GBM.pdf
UNISDR, 2009. *Drought Risk Reduction Framework and Practices*. Available at: www.unisdr.org/eng/about_isdr/isdr-publications/10-drought-risk-reduction/drought-risk-reduction.pdf

Climate change, disasters and humanitarian implications

CARE, OCHA & Mapplecroft, 2008. *Mapping emerging trends & risk hotspots*. Available at: www.careclimatechange.org/files/reports/CARE_Human_Implications.pdf
CCD, 2009. *Closing the gaps: Disaster risk reduction and adaptation to climate change in developing countries*. Available at: www.ccdcommission.org/Filer/report/CCD_REPORT.pdf
Global Humanitarian Forum, 2009. The Anatomy of a Silent Crisis. Available at: www.ghfgeneva.org/Portals/0/pdfs/human_impact_report.pdf
OCHA, WFP & IFRC, 2009. *Addressing the humanitarian challenges of climate change*. Available at: www.humanitarianinfo.org/iasc/downloaddoc.aspx?docID=4862&type=any
IPCC, 2007. *Climate Change 2007 Synthesis Report*. Available at: www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm
Oxfam, 2009. *Suffering the Science*. Available at: www.oxfam.org/sites/www.oxfam.org/files/bp130-suffering-the-science.pdf
UNISDR, 2008. *Climate change and disaster risk reduction*. Available at: www.unisdr.org/eng/risk.../Climate-Change-DRR.pdf
University of Copenhagen, 2009. *Global Risks Challenges & Decisions*. Available at: http://climatecongress.ku.dk/
World Bank, 2009. *World development report 2010.* Available at: www.worldbank.org/wdr2010

Climate change adaptation & disaster risk reduction

IFRC, 2009. *DRR 2001-2008 lessons learned*. Available at: www.preventionweb.net/english/professional/publications/v.php?id=11069
IIED, 2009. *Community-based adaptation to climate chan*ge. Available at: www.iied.org/pubs/display.php?o=14573IIED
OCHA & UNISDR, 2008. *Disaster Preparedness for Effective Response - Hyogo framework*. Available at: http://ocha.unog.ch/drptoolkit/PreparednessTools/Disaster%20Preparedness%20Planning/Disaster-preparedness-for-effective-response-web.pdf
Red Cross/Red Crescent Climate Centre, 2007. *Climate guide*. Available at: www.climatecentre.org/site/publications/85
Twigg, 2007. *Characteristics of a disaster resilient community*. Available at: www.proventionconsortium.org/themes/default/pdfs/characteristics/community_characteristics_en_highres.pdf
UNISDR, 2008. *Linking DRR & Poverty Reduction, good practices & lessons learned*. Available at: www.preventionweb.net/english/professional/publications/v.php?id=3293
UNISDR, 2009. *Global Assessment Report on DRR*. Available at: www.preventionweb.net/english/hyogo/gar
UNISDR, 2009. *Adaptation to climate change by reducing disaster risks - country practices and lessons*. Available at: www.preventionweb.net/files/11775_UNISDRBriefingAdaptationtoClimateCh.pdf
USAID, 2007. *Adapting to climate variability and change: A guidance manual for development planning*. Available at: www.usaid.gov/our_work/environment/climate/docs/reports/cc_vamanual.pdf
WRI, 2007. *Weathering the storm*. Available at: www.wri.org/publication/weathering-the-storm
⇒ *Refer as well to the websites proposed pages 29, 36 and 37*

All referred material on the World Wide Web was consulted in February 2010.