

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/305706073>

Climate Change in Africa: A Guidebook for Journalists.

Book · January 2013

CITATIONS
18

READS
1,879

4 authors, including:



[Mike Shanahan](#)

23 PUBLICATIONS 998 CITATIONS

SEE PROFILE

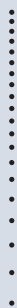
Some of the authors of this publication are also working on these related projects:



Indigenous knowledge and practices on climate change adaptation in Asia [View project](#)



United Nations
Educational, Scientific and
Cultural Organization



UNESCO Series on Journalism Education

Climate Change in Africa:

A Guidebook for Journalists

UNESCO Series on Journalism Education

Climate Change in Africa:

A Guidebook for Journalists

Written by: Mike Shanahan (International Institute
for Environment and Development),
Willie Shubert (Internews/Earth
Journalism Network),
Cameron Scherer (Internews/Earth
Journalism Network) &
Teresa Corcoran (International Institute
for Environment and Development)

Edited by: Fackson Banda (UNESCO)

Published in 2013 by the United Nations Educational, Scientific and Cultural Organization,
7, place de Fontenoy, 75352 Paris 07 SP, France

© UNESCO 2013

ISBN 978-92-3-001234-2



This publication is available in Open Access under the Attribution-ShareAlike 3.0 IGO (CC-BY-SA 3.0 IGO) license
(<http://creativecommons.org/licenses/by-sa/3.0/igo/>).

By using the content of this publication, the users accept to be bound by the terms of use of the UNESCO Open Access Repository
(<http://www.unesco.org/open-access/terms-use-ccbysa-en>).

The designations employed and the presentation of material throughout this publication do not imply the expression of any opinion whatsoever on the part of UNESCO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The ideas and opinions expressed in this publication are those of the authors; they are not necessarily those of UNESCO and do not commit the Organization.

Cover photo: © UN Photo/Fred Noy

Graphic design: UNESCO

Cover design: UNESCO

Illustrations: All photographs in this book are reproduced under Creative Commons licenses CC BY-NC-ND 2.0 & CC BY-NC-SA 2.0 (<http://creativecommons.org/licenses/by-nc-nd/2.0/>). The infographic maps are reproduced with permission of Connect4Climate.

Typeset: UNESCO

Printed by: UNESCO

Printed in France

Contents

Foreword.....	7
Part One: The essentials.....	9
Why climate change matters to every journalist and every media outlet	10
What's at stake?	10
The injustices of climate change	10
Why media coverage matters	11
What's the story?	11
What's missing from African media coverage of climate change?	12
How this book can help	12
Climate change in quotes	13
Seven things every journalist should know about climate change	14
How do we know what we know about the climate?	14
Climate or weather? Change or variability?	14
How do human activities affect the climate?	15
Impacts of climate change	15
Mitigation and adaptation	15
The Intergovernmental Panel on Climate Change	15
The UN Framework Convention on Climate Change	16
Vulnerability and resilience	17
Africa's coming energy challenges	18
Gender dimensions of climate change	19
Renewable energy and women	20

Part Two: The problem in-depth 21

Why is the climate changing?	22
Greenhouse Gases, the Greenhouse Effect and Global Warming	22
What emits greenhouse gases? Whose emissions are they?	22
Africa's emissions	23
What else affects the global climate?	23
How much heat?	23
How much more heat?	23
Three important ways global warming creates problems	24
Erratic precipitation	24
Extreme events	24
Rising seas	25
Attribution, or "is it climate change?"	25
What climate change means for agriculture and food security	27
Tea Production in Kenya	28
How climate change can affect human health	29
What is climate change going to cost?	30
Counting the cost of climate change in Namibia	30
The costs of climate change in coastal Egypt	31
Costs of adapting to climate change	31
Climate finance	31
Climate change and conflict?	32
Climate change and migration?	33
Where migration and conflict meet	34
Darfur: Ecological disaster first?	34

Part Three: Solutions in-depth 37

How can we limit climate change?	38
Being paid to plant and protect forests (REDD+)	38
REDD+ in Africa	39
Case Study: Kenya	39
Climate-friendly energy	40
Using renewable energy instead of fossil fuels	40
Ethiopia embraces renewable power	41
Energy Efficiency	41
Climate-smart energy in sub-Saharan Africa	42
Biofuels: Win-win or risky business?	42
Reducing emissions from agriculture	43

Agro-ecology	43
Soil fertility management	43
Urban farming	44
How can we adapt to the impacts of climate change?	45
The Adaptation Fund	45
Adapting agriculture	46
Genetically modified crops and climate change	47
Adapting towns and cities	48
Adapting to urban flooding in African cities	49

Part Four: Climate change policies and plans 51

International treaties to tackle climate change	52
A brief history of the UNFCCC's main impacts	52
What the UNFCCC requires African governments to do	54
Mitigation	54
Adaptation	54
Communication, information and learning	54
Intergovernmental action on climate change	56
African leadership on climate change	57

Part Five: Reporting on climate change 59

Seven quick tips for finding stories to report	60
Climate change on the radio	61
Twelve quick tips for better stories	62
Reporting climate change in local languages	63
Reporting on specific aspects of climate change	65
Reporting on Adaptation	65
Questions to ask	65
Sources of information	65
Reporting on REDD+	66
Questions to ask	66
Sources of information	66
Reporting on climate change and health	68
Questions to ask	68
Sources of information	68
Reporting on the international climate change negotiations	69
Questions to ask	69
Sources of information:	69

Reporting on scientific research on climate change	70
Finding research to report	70
Avoiding sensationalism	71
Reporting scientific uncertainty	71
Reporting on risk	72
Sources of information	72
Sourcing and using data, photos, maps, and graphics	73
Using data	74
Images that add to the climate change story	74
Part Six: Reference section.....	75
Africa’s climate and how it might change	76
Five key drivers of climatic conditions in Africa	76
North Atlantic Oscillation	76
Inter-Tropical Convergence Zone	76
El Niño–Southern Oscillation	76
West-African Monsoon	76
Indian Ocean Dipole	77
Regional variations in climate	77
North Africa	77
West Africa	77
East Africa	77
Central Africa	78
Lake Chad: Where climate and mismanagement collide	78
Southern Africa	78
Country-by-country: Finance, emissions and vulnerability	79
Directory of climate change contacts for journalists	81
Civil society organisations	81
Academics and researchers	82
Government/intergovernmental/UN/donor	83
Networks of journalists	84
International / regional	84
National networks	84
Glossary of climate change terms	86
List of contributors	91
List of guidebook authors	91
List of peer reviewers	91
List of UNESCO staff	91

Foreword

Climate change poses a clear danger to lives and livelihoods across Africa. Journalists there have critical roles to play in explaining the cause and effects of climate change, in describing what countries and communities can do to adapt to the impacts ahead, and in reporting on what governments and companies do, or do not do, to respond to these threats. Yet research on public understanding of climate change – such as the BBC Media Action’s Africa Talks Climate project – and surveys of journalists reveal that across Africa the media can and should do more to tell the story of climate change. UNESCO produced this book to help fill this important gap.

The authors of this guide represent two organisations that have trained hundreds of journalists around the world to report more effectively on climate change, and have set up the Climate Change Media Partnership to increase the quantity and quality of climate change coverage in the media. For this book, they also consulted African journalists and climate-change specialists. 44 journalists from 17 countries – Botswana; Cameroon; Democratic Republic of Congo; Ethiopia; Ghana; Kenya; Liberia; Madagascar; Malawi; Nigeria; Senegal; South Africa; South Sudan; Tanzania; Uganda; Zambia and Zimbabwe – completed a survey to identify their knowledge gaps and explain what they thought this book should contain. 38 African climate change specialists completed a separate survey to provide their insights into what was missing from African media coverage and how this book should help to fill those gaps.

In October 2013, UNESCO gathered a panel of African experts to review the draft text and suggest ways to improve it. The meeting, which took place from 22-23 October 2013, in Nairobi, Kenya, brought together experts from Botswana, Ethiopia, Ghana, Namibia, Nigeria, Rwanda, South Africa, Uganda, Zambia and Zimbabwe. This group and another panel of reviewers validated the text before UNESCO published it.

Janis Karklins
Assistant Director-General for Communication and Information

Part One: The essentials

Why climate change matters to every journalist and every media outlet

What's at stake?

The Earth's climate has always changed but because of human activities it is now changing faster than it has for thousands of years.¹ This is what scientists and politicians mean when they talk today of climate change. This climate change is here to stay. It will affect all of our lives and nearly every aspect of society, from our health and food supplies to business and national economies.

Climate change threatens to reverse many of the development gains that African nations have made.² It poses threats to food and water security, to political and economic stability, to livelihoods and landscapes. But it also creates opportunities for African politicians, business leaders and communities to act in ways that bring benefits for all. It can create opportunities for new business models and innovations, new routes to sustainable development and new ways for ancient knowledge to have an impact at home and in the wider world. But right now, the odds are stacked against Africa, thanks to the inequity at the heart of the climate change story.

The injustices of climate change

Climate change is inherently unfair. The countries and communities that are most at risk from its impacts, and are least able to adapt, are those that have contributed least to the problem. If poorer nations pursue economic growth by the same means from which the industrialised nations have benefitted – such as by burning coal and clearing forests – they will only add to the climate change problem. Indeed, the richest nations insist that all nations – including the poorest ones – should act to limit climate change, but when the poorest nations ask the richer ones for help to do so, they don't get the finance and technology they need in return.

The international negotiations on climate change are themselves unfair, as some countries wield considerable power while others have little to bring to the table other than moral arguments. The more vulnerable nations can do little when industrialised nations fail to act to limit climate change, or even break promises they have made in the past. And when the richer nations provide 'climate finance' in the form of loans not grants, they are in effect asking poorer nations to pay to fix a problem the richer nations created. There is also inequity with countries, as it is the poorest communities that are most vulnerable to climate change. Again, these tend to be the people who have done least to contribute to the problem.

1 See National Science Foundation, 2013, Earth Is Warmer Today Than During 70 to 80 Percent of the Past 11,300 Years. Press release. (http://www.nsf.gov/news/news_summ.jsp?cntn_id=127133&org=NSF&from=news)

2 See AMCEN, 2011, *Addressing Climate Change Challenges in Africa: A Practical Guide Towards Sustainable Development*. http://www.unep.org/roa/amcen/docs/publications/guidebook_ClimateChange.pdf, H. Besada & N. K. Sewankambo. *Climate Change in Africa: Adaptation, Mitigation and Governance Challenges*. Centre for International Governance Innovation http://www.unicef.org/esaro/Climate_Change_in_Africa.pdf and C. Toulmin, 2009, *Climate Change in Africa*. Zed Books, London.

These ethical and moral aspects of climate change have prompted the concept of “climate justice”, which civil society organisations from across Africa have used to call upon governments and others to recognise the rights and needs of the climate-vulnerable poor. Climate justice activists call for the equitable distribution of resources to tackle climate change and for climate-vulnerable people to take part in decisions about how the money gets spent. These ethical conundrums, of how to ensure fair opportunities for all people and how to ensure that nations and people act according to their responsibilities and capabilities, are at the core of the climate change story at local, national and international stages.

Why media coverage matters

Climate change is not going away. It will get worse before it gets better. For African nations and people to seize the opportunities and reduce the risks, everyone will need to know more about climate change. The way the media covers it will affect how well societies deal with the problem. Climate change will become increasingly important to African journalists, and African journalists will become increasingly important to the global response to climate change.

As climate change takes hold, people will demand information about what is happening and what they and their governments can do about it. Wise and responsible media managers will see that climate change presents an opportunity to grow and better serve these audiences. Three of the media’s traditional roles — informing audiences, acting as watchdogs and campaigning on social issues — are especially relevant. Media coverage will also provide a vital link between the science and the service providers upon which much will depend.

For African journalists, coverage of climate change means several things. At home, it can save lives, change policy and empower people to make informed choices. Through informed reporting, journalists can shine a light on the wealth of activities that people are already undertaking to prepare for climate change. Internationally, it can bring African stories to global audiences and help encourage the rich and powerful countries, their citizens and the companies based there, to act in solidarity with climate vulnerable communities.

What’s the story?

Climate change is not just a story: it is the context in which so many other stories will unfold. As such, it is not a subject solely for science or environment reporters to cover. That’s why it is essential for all journalists, editors and media owners to understand at least the basics of climate change and realise that there is more to it than carbon dioxide and disasters. Contrary to popular belief, this is an issue full of stories that can sell newspapers and attract new audiences online, in print and on the airwaves. Here is just a small sample of the kinds of stories journalists can tell. These are all real stories that African journalists reported in 2013.³

- A foreign company buys up land in Cameroon so it can ‘sell’ the carbon in the soil and the trees to big companies in Europe and North America.
- Tanzanian farmers are banned from farming their own land by a company that has loaned it from beneath their feet to grow biofuel crops.
- Billions of dollars could flow from industrialised nation into the Congo basin but only if countries there protect their forests and show how local communities will benefit.
- Kenya’s famed long-distance runners complain that rising temperatures are affecting their performance.
- Diplomats from The Gambia go toe-to-toe with negotiators from the United States and Europe in the interests of all African nations.

3 See the climate change news archive at Reuters AlertNet (www.trust.org/?show=alertnetclimate)

- A business in Kenya creates jobs by turning waste from sugar mills into fuel that is cheaper and cleaner than charcoal, oil or coal.
- Pastoralists have swapped their generations-long tradition of herding cattle to become solar power engineers to bring power to remote schools.

What's missing from African media coverage of climate change?

In researching this book the authors asked African climate change specialists from academia, civil society organisations and government agencies what they wanted to see more of in the media's coverage of climate change. The following responses summarise the main areas they saw for improvement, and should give journalists ideas for story angles to consider.

- Fewer disaster narratives and more success stories highlighting how people are adapting, developing solutions and using new technologies that can limit climate change.
- More coverage of African roles and responsibilities under the UN climate change convention, and what governments say and do at the international negotiations.
- More coverage of the status of National Adaptation Programmes of Action and the National Adaptation Plans.
- More stories that demonstrate how climate change affects men and women, old people and young people in different ways.
- More stories that explain the causes, including climate change, of events such as droughts and floods.
- More stories that explain the human side of climate change and show this is a 'development' and 'people' issue, just as much as an environmental one.
- More stories about the business and development opportunities that climate change present.

How this book can help

This book is primarily for journalists and editors, and for teachers and trainers of journalists. It aims to support journalists with little time or resources to improve their coverage. It is not an encyclopaedia – climate change is too big a topic to cover in such a short volume. While this book does not aim to cover everything it should enable journalists to understand all of the key concepts, report on climate change effectively and find more information and interviewees.

- Part One presents general knowledge that every journalist needs in order to report on climate change.
- Part Two provides greater detail on different aspects of the impacts of climate change in Africa.
- Part Three covers ways to limit climate change and adapt to its effects.
- Part Four explains how governments are enacting policies and plans, at national, regional and global levels, to deal with climate change.
- Part Five provides tips and advice to help journalists improve their reporting.
- Part Six presents some additional reference material and sources of information.

Climate change in quotes

“This is the time for Africa. We are poised on a hopeful pathway, a transformative development agenda. Climate change can increase the opportunity space for Africa to invest in renewable energy technologies, turn agriculture into a booming industry, build human and institutional capacities towards a knowledge economy that supports innovation, research and development; invest in climate services in ways that will leverage the potential of hydro-meteorological services so they can act as a credible resource for farmers and a range of people dependent on natural resource assets; use the collective voice of our 54 countries to make finance flow, and ensure that our call for new and additional funds are aligned to our national priorities, systems and institutions.”⁴

Fatima Denton

Coordinator of the UNECA African Climate Policy Centre

“One billion Africans are in harm’s way. We witness instability in rainfall, diseases spreading, sea level rise and floods. One of the effects of climate change is to send Africans further and further to seek water. This brings them into conflict with other Africans. We are faced with wars on African soil that are not created in Africa.”⁵

Tosi Mpanu

Chair of the Africa Group at the UN climate change negotiations

“Climate change is posing a systemic risk to long-term economic growth and stability, and you’ve got to get your head around it now, and depending on which country you are, you’ve got different challenges. Wherever you are on the planet, whichever government you’re the minister of finance of or whichever company you’re the CEO of, this is a risk that you need to understand.”⁶

Rachel Kyte

World Bank Vice-President for Sustainable Development

“Poverty eradication is Africa’s overriding priority, with people’s access to clean energy access at the centre of concern. Renewable power is found in abundance on the continent. Large areas of the African continent are ideal for solar and wind installations, and geothermal energy is already exploited in some areas. Use of these renewable and indigenous resources mean the continent would be able to have more secure and clean energy supplies, that will also assist in breaking the cycle of high-carbon development that has led to the world being threatened by accelerating climate change.”⁷

Emily Massawa

Team Leader on Climate Change in the UNEP Regional Office for Africa

“Since we started rebroadcasting the COBAM radio programme [on climate change and forests in the Congo Basin] people — particularly farmers — have been coming to our studio for more information on how to deal with unpredictable seasons and have better harvests.”⁸

Mngo Demse

Community radio journalist in Bamenda, Cameroon

4 See Fatima Denton’s speech at the the Third Annual Conference on Climate Change and Development in Africa, 21-23 October 2013 (<http://www.climdev-africa.org/node/889>)

5 See P. Brown, 2013, Warsaw – Day 9: One billion Africans in harm’s way, Climate News Network(<http://www.climateactionnetwork.net/2013/11/warsaw-day-9-one-billion-africans-in-harms-way/>)

6 See J. Confino, 2013, World Bank warrior spearheading the fight against climate change. TheGuardian.com (<http://www.theguardian.com/sustainable-business/world-bank-fight-climate-change>)

7 See E. Massawa, 2011, Climate Change Negotiations: Keeping Africa Safe. IISD Climate Change Policy and Practice (<http://climate-iiisd.org/guest-articles/climate-change-negotiations-keeping-africa-safe/>)

8 See B. Akinwande, 2013, Could radio help mitigate climate change in the Congo Basin? (<http://www.trust.org/item/20130521135629-fq8ht/>).

Seven things every journalist should know about climate change

This section introduces concepts that every journalist should know and understand about climate change. There is more detail about each of these topics later in the book.

How do we know what we know about the climate?

Scientists use weather stations, balloons, satellites and other instruments that measure the properties of our climate and atmosphere to create a picture of the current situation. This includes measuring temperature on land and the surface of the sea, the concentration of carbon dioxide in the atmosphere, the intensity of storms, the density of forests and the sources of greenhouse gas emissions. To get a picture of our past climate they need to use different methods. One way is to study the rings that form in tree trunks with each year's growth. Their size and other properties reveal something – but not everything – about the local climate in the year that each ring grew. Another approach is to drill out long cores of ice and examine the contents of the small air bubbles within the ice. The bubbles contain a sample of the air and scientists can use its properties to estimate the temperature, precipitation, concentration of greenhouse gases and amount of forest fires at the time the ice formed. They have analysed gas trapped in ice cores to understand how our climate has changed over hundreds of thousands of years. To get a picture of our future climate, scientists use computer models that draw upon thousands of pieces of information about the current and past climates to make predictions about what will happen if greenhouse gas emissions continue to rise.

Climate or weather? Change or variability?

Weather is what we experience from day to day. Climate refers to the average conditions a place experiences over many years. Climate variability refers to natural changes through which the conditions differ from the long-term average. This can include periodic changes in rainfall linked to monsoons or to the natural events called “El Niño” and “La Niña” through which ocean currents affect rainfall. Climate change, by contrast, refers to long-term (decades or longer) trends such as the increase in the global average temperature over the past century. It also includes long term changes in climate variability such as changes to the number and scale of droughts, floods and other extreme events. When scientists and policymakers talk about “climate change” today they tend to mean the portion of climate change that human activities cause. **Part 6 of this book describes Africa's main climatic patterns and how they might change.**

How do human activities affect the climate?

Some gases such as carbon dioxide can trap heat in the Earth's atmosphere, through a phenomenon scientists call the greenhouse effect. Many human activities emit these greenhouse gases. When we burn fossil fuels such as coal and oil to produce electricity or drive cars, or when we clear forests to grow crops more of these emissions reach the atmosphere. Ever since the start of the Industrial Revolution in the mid-18th century, these gases have increased in concentration. At the same time the Earth has experienced a gradual warming. This global warming is the cause of the climate change that scientists say we need to understand and limit. **Part 2 of this book covers the greenhouse effect in more detail.**

Impacts of climate change

The immediate impacts of rising temperatures include rising sea levels, less predictable weather and more extreme events such as droughts, floods and storms. The changing temperature and rainfall patterns can produce additional effects on water supplies, on crops and their pests and pollinators, and on organisms that cause disease. They can also have physical impacts on infrastructure, and all of these impacts can combine to create additional social, economic and political impacts. While it is difficult to prove that any single event is the result of climate change, many climatic trends and events that have been observed already are consistent with scientific predictions. **Part 2 of this book covers the impacts of climate change in more detail.**

Mitigation and adaptation

The two main strategies for reducing the threat climate change poses are mitigation and adaptation. Mitigation refers to any activities that reduce the overall concentration of greenhouse gases in the atmosphere. This includes efforts to switch from fossil fuels to renewable energy sources such as wind and solar, or to improve energy efficiency. It also includes efforts to plant trees and protect forests, or to farm land in ways that prevent greenhouse gases from entering the atmosphere. Adaptation refers to activities that make people, ecosystems and infrastructure less vulnerable to the impacts of climate change. This includes things like building defences to protect coastal areas from rising seas, switching to drought or flood resistant crop varieties, and improving systems to warn of heat-waves, disease outbreaks, droughts and floods. **Part 3 of this book covers the mitigation and adaptation in more detail.**

The Intergovernmental Panel on Climate Change

The main scientific authority on climate change is the Intergovernmental Panel on Climate Change (IPCC), which the UN set up in 1988. The IPCC gathers thousands of scientists to review the global body of knowledge about climate change and summarise it in reports that policymakers can use. Every few years the IPCC produces an Assessment Report. Before the IPCC published these, scientists first review them and then governments review and endorse them. The 4th Assessment Report (2007) said that there was no doubt now that the atmosphere was warming, that human activities were 90 per cent likely to be the cause of most of the recent warming and that the impacts of climate change could be sudden and irreversible. The 5th Assessment Report will appear in sections in late 2013 and early 2014. **Part 4 of this book has advice on reporting on climate science.**

The UN Framework Convention on Climate Change

The UN Framework Convention on Climate Change (UNFCCC) is an international treaty that nearly 200 governments agreed in 1992 with the aim of preventing dangerous climate change. This treaty produced the Kyoto Protocol, the agreement that required some industrialised countries to reduce their emissions of greenhouse gases. Each year the countries that are party to the UNFCCC meet to review progress and negotiate new action. **Part 3 of this book covers the UNFCCC and Kyoto Protocol in more detail.**



Farmers Aissat Abduljub and Habiba Wellba show Senegalese singer Baaba Maal their failed crops. The maize has gone dry and is inedible. Credit: Pablo Tosco/Oxfam International

Vulnerability and resilience

There are many kinds of vulnerability. Low-lying coastal countries and small islands face risks very distinct from those that landlocked or mountainous nations face. Small countries whose economies depend on few sectors are vulnerable in ways which bigger countries with large populations of poor citizens are not, and vice versa. Organisations that have tried to make sense of these differences include non-profit organisation DARA and the Climate Vulnerable Forum. They developed the Climate Vulnerability Monitor⁹ to assess and track changes to the vulnerability of 184 countries. This index considers each country's exposure to extreme weather events and other climatic risks, its sensitivity to environmental change, dependence on environmental goods and services, and its economic, technical and political capacity to adapt to climate change.

Within countries, the picture becomes even more complex, as the vulnerability of individuals and communities varies greatly, as does the extent to which different businesses, economies, ecosystems and infrastructure are vulnerable. At all scales, vulnerability is linked to wealth and power: often it is the poorest and most marginalised of people who are most vulnerable. That said, rich people and rich countries are not immune to the effects of climate change. Across all groups, the very old and the very young are most at risk from any health-related impacts of climate change, and, in general, women are more vulnerable than men. Mortality rates during extreme weather events are often greater for women than they are for men, as women face many social, economic and other barriers that limit their capacity to protect themselves. The same groups of people most vulnerable to climate change impacts tend also to be the ones least able to adapt.

When storms or floods hit cities, it is generally the urban poor that are hit hardest in terms of deaths and injuries. Most houses in informal settlements are poorly built and thus more liable to collapse when hit by storms or floods. Many informal settlements develop on dangerous sites such as flood plains or unstable slopes because housing on safer sites is too expensive. As a result, large sections of the urban population are very vulnerable to any increases in the frequency or intensity of storms, floods, landslides or heat waves, and to increased risk of disease, constraints on water supplies or rises in food prices.

9 See <http://daraint.org/climate-vulnerability-monitor>

Many factors affect resilience, the ability to deal with disturbances and return to normality soon after. They include diversity (as when farmers grow many kinds of crop, or when economies do not depend largely on a single sector), adaptability (as in flexible governance, capacity to respond fast to change), strong reserves (finances, food, knowledge and biodiversity, such as seed banks), and strong social capital (such as leadership and social networks).

Africa's coming energy challenges

Energy insecurity is a key challenge to growth and development in Africa. According to the World Energy Council, in sub-Saharan Africa, over 500 million people lack reliable access to affordable electricity.¹⁰ As governments take steps to power their rural constituents, they will very likely rely on two electricity sources, biomass and hydropower, particularly vulnerable to the impacts of climate change, namely drought. Energy security hotspots are arising more and more frequently: in Zambia, where forest covers 60 per cent of the country's landmass,¹¹ decreased rainfall has severely reduced the country's biomass production potential; in Kenya, extreme heat is drying up the Tana River, where the country sources 60 per cent of its hydroelectric power.¹²

10 See International Energy Agency, 2011, Global status of modern energy access. (<http://www.worldenergyoutlook.org/resources/energydevelopment/globalstatusofmodernenergyaccess/>).

11 See M. Keddy, 2003, Forest Cover Crisis in the Sub-Tropics: A Case Study from Zambia. (<http://www.fao.org/docrep/ARTICLE/WFC/XII/1022-B1.HTM>).

12 See M. Burnham & N. Gronewold, 2010, Droughts turn out the lights in hydro-dependent African nation. New York Times, 10 May 2010 (<http://www.nytimes.com/gwire/2010/05/10/10greenwire-droughts-turn-out-the-lights-in-hydro-dependen-40458.html>).

Gender dimensions of climate change

Climate change is a global phenomenon; as such, all people are vulnerable to its impacts. And, yet, one major demographic in particular disproportionately bears the brunt of shifting weather patterns: women. The fact that the world's women must suffer the consequences of a warming planet more acutely than their husbands, brothers, and fathers is made all the more ironic by the fact that women have repeatedly found themselves at the margins of the political decision-making process. And, yet, while an increasing number of stories highlight the human costs of climate change, too few recognize the inherent gender dynamic present when discussing the causes, impacts, and response to global warming.

In the strictest sense, there is an argument to be made that climate change has claimed the lives of more women than men: a 2006 London School of Economics paper studied 4,605 natural disasters in 141 countries and found that, particularly in countries with a high level of discrimination against women – say, not being able to move freely without a male escort – casualties were higher among women than among men.¹³ With the number of weather-related natural disasters having quadrupled in the past two decades,¹⁴ a pattern that is only predicted to exacerbate in the future – our changing climate is set to further endanger women's lives.

But the threat climate change poses to women is hardly limited to natural disasters. Often constrained by laws and cultural norms that limit their economic opportunities, many women in developing countries depend upon agriculture. Indeed, women produce roughly 60 per cent of the world's food; in Africa, this number reaches up to 80 per cent.¹⁵ Even within the already challenging sector of subsistence agriculture, women face additional obstacles: land ownership restrictions (women own approximately 1 per cent of the world's land¹⁶) allow very few women to gain financial control any productive land upon which they may farm.

What does climate change mean for women in agriculture? Desertification in arid regions forces women and girls to spend more time and travel further to collect scarce resources such as water and firewood – leaving less time for education or other means of generating income. Lower crop yields due to drought or flood – the IPCC projects that

13 See E. Neumayer and T. Plumper. 2006. The Gendered Nature of Natural Disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981-2002. London School of Economics. (<http://www.lse.ac.uk/geographyAndEnvironment/whosWho/profiles/neumayer/pdf/Disastersarticle.pdf>)

14 As reported by a November 2007 Reuters story 'Disasters quadruple over last 20 years: Oxfam' (<http://www.reuters.com/article/2007/11/25/us-britain-climate-oxfam-idUSL2518480220071125>)

15 See the FAO factsheet on women and sustainable food security (<http://www.fao.org/sd/fsdirect/fbdirect/fsp001.htm>)

16 See R. Lefton, 2013, Gender Equality and Women's Empowerment Are Key to Addressing Global Poverty. Centre for American Progress. (<http://www.americanprogress.org/issues/poverty/news/2013/03/11/56097/gender-equality-and-womens-empowerment-are-key-to-addressing-global-poverty/>)

yields of rainfed crops will drop by up to 50 per cent in sub-Saharan Africa by 2020¹⁷ – lead to emptier pockets after the harvest, and emptier plates for children. And with rising temperatures driving up the risk of certain diseases, women, as the primary family caregivers in many communities, must devote time to sick family members that they would otherwise spend in their fields, on other work or studying. As climate change worsens in developing countries, threatening in particular the livelihoods of families heavily dependent on subsistence agriculture, women around the world can expect to face even greater hurdles in achieving sufficient education, greater economic opportunities, and gender equality.

This gender imbalance on the local level is mirrored on the global scale, as evidenced by the dominance of men across the international decision-making process. One need look no further heavily skewed gender composition of the major summits on climate change: there has yet to be a conference of parties to the UN Framework Convention on Climate Change at which at least one-third of negotiators were women, or at which women comprised at least one-fifth of delegation heads.¹⁸

Women are also underrepresented in the world's leading body of climate-change researchers — the Intergovernmental Panel on Climate Change (IPCC) — whose reports inform the UNFCCC negotiations. Only five of the 31 members of the panel's senior management (the IPCC Bureau) are women. Among the most senior roles, the IPCC chair, three vice-chairs and eight of nine working group co-chairs are all men. Of the IPCC's 600 lead authors for 2007's Fourth Assessment Report, just 16 per cent were women.¹⁹

The implications of women's absence from these two leading bodies of climate change researchers and responders are profound. Women represent over half the global population, and not only does their disempowerment prevent us from understanding the true extent to which climate change is disrupting the way of life for our most at-risk communities, it also perpetuates the antiquated narrative that women are mere victims rather than agents of change. Indeed, from growing drought-tolerant crops in Kenya²⁰ to drawing upon indigenous knowledge to protect farmland against monsoons in India,²¹ women around the world are demonstrating that adapting to and mitigating climate change is possible.

This institutional exclusion is slowly eroding. In 2012, the nearly 200 governments at the UN climate change talks agreed to promote gender equality in the negotiations.²² Still, this decision is non-binding, and only "encourages" equal representation of genders in future negotiations.

Renewable energy and women

Renewable energy is central to the mitigation of climate change. It can also play an important role in improving the health and wealth of women in poor, rural communities. Women and children are disproportionately exposed to indoor air pollution from burning wood and coal inside as cooking and heating fuels. According to the World Health Organization: "Women exposed to heavy indoor smoke are three times as likely to suffer from chronic obstructive pulmonary disease (e.g. chronic bronchitis), than women who use cleaner fuels."²³ Granting rural women access to and control over clean and renewable energy sources is crucial to protecting them against harmful diseases and providing an opportunity for them to manage their own economic futures.

17 See InterAcademy Council, 2010, Climate change assessments Review of the processes and procedures of the IPCC. (<http://reviewipcc.interacademycouncil.net/report/Climate%20Change%20Assessments,%20Review%20of%20the%20Processes%20&%20Procedures%20of%20the%20IPCC.pdf>).

18 See M. Shanahan, 2013, Missing women hold key to sluggish climate talks, published online by Responding to Climate Change (<http://www.rtcc.org/2013/04/10/missing-women-hold-key-to-sluggish-un-climate-talks/>)

19 See N. Herzhoff and M. Shanahan, 2011, Raising the profile of Gender and Generation: The role of the Climate Change Media Partnership. IIED. (<http://pubs.iied.org/pdfs/G03096.pdf>).

20 See I. Esipisu, 2013, Kenyan MPs to champion rural women's influence on climate policy. Thomson Reuters Foundation (<http://www.trust.org/item/20130610132743-oypdg/>)

21 See S. Paul, 2012, Inequality deepens climate challenge for India's women farmers. Thomson Reuters Foundation. (www.trust.org/item/20121030094100-ik53r/)

22 See UNFCCC website on Gender and Climate Change (http://unfccc.int/gender_and_climate_change/items/7516.php)

23 World Health Organization, 2011, Indoor air pollution and health. Fact sheet 292 (<http://www.who.int/mediacentre/factsheets/fs292/en/>).

Part Two:
The problem
in-depth

Why is the climate changing?

Greenhouse Gases, the Greenhouse Effect and Global Warming

The Earth receives energy from the sun in the form of ultraviolet rays (light) and releases some of this energy back into space as infrared rays (heat). Gases can absorb some of this outbound energy and re-emit it as heat. These gases – which include water vapour, carbon dioxide, methane, nitrous oxide and others – are called ‘greenhouse’ gases. They act like a blanket that surrounds the Earth and keeps it warmer than it would otherwise be, just as the glass panes of a greenhouse allow the sun’s energy to enter but prevent some of the heat from escaping. Without this natural process, known as the greenhouse effect, our planet would be on average about 30 degrees Celsius cooler, so the greenhouse effect is essential. But too much of an effect will create problems. Human activities over recent generations have artificially raised the concentration of greenhouse gases in the atmosphere and scientists conclude that this is why the planet has warmed in recent history. But, because greenhouse gases can last in the atmosphere for a long time, even if all emissions worldwide stopped today, the climate would continue to change.

The greenhouse effect is not a new discovery. Joseph Fourier discovered it in 1824, John Tyndall experimented on it in 1858, and Svante Arrhenius quantified it in 1896. Since then scientists have provided growing evidence not only that the concentration of greenhouse gases in the atmosphere has increased, but also that this increase threatens to cause dangerous climate change. Measurements from Antarctic ice cores show that for about 10,000 years before the Industrial Revolution the concentration of carbon dioxide in the atmosphere was about 280 parts per million (ppm) by volume. Since then it has risen rapidly: in 2013, the concentration reached 400 ppm, a threshold that last occurred over three million years ago. Then, the world on average was 3-4 degrees Celsius warmer than it is today and sea levels were much higher.

What emits greenhouse gases? Whose emissions are they?

Major sources of greenhouse gas emissions from human activities include power generation (about 25 per cent of all emissions), transport, industrial activities, deforestation and agriculture. Countries have historically varied greatly (and continue to today) in the type, source and amount of greenhouse gases they emit. The biggest emitter overall today is China, but its large population means that emissions per person (per capita) are lower than in many other countries. Historically the United States has emitted more greenhouse gases than any other country, and today its per capita emissions are still among the highest worldwide: 100-200 times greater than per capita emissions in most African nations. The question of who is responsible for climate change becomes complicated when consumer demand in one country increases emissions in another.

Africa's emissions²⁴

Africa's emissions are low in both absolute and per capita terms. Total emissions for Africa increased twelve-fold between 1950 and 2008, reaching 311 million metric tons of carbon, which is still less than the emissions for some single nations including China, the United States, India, Russia, and Japan. Although per capita emissions in 2008, at 0.32 metric tons of carbon, were three times those in Africa for 1950, they were still only 6.6 per cent of those in North America.

Emissions from all fuel sources have grown in the African region over time with liquid and solid fuels now each accounting for approximately 35 per cent and gas fuels accounting for 17 per cent of the regional total. A small number of nations are largely responsible for the African emissions from fossil fuels and cement production; South Africa accounts for 38 per cent of the continental total, and another 46 per cent comes from Egypt, Algeria, Nigeria, Libya and Morocco combined.

These are the only six countries on the continent with annual CO₂ emissions in excess of 10 million metric tons of carbon. Only four African countries have per capita CO₂ emissions higher than the global average (1.3 metric ton of carbon per year): Libya (2.53), South Africa (2.39), the Seychelles (2.22), and Equatorial Guinea (1.99). Based on 2008 per capita emission rates, 28 of the 55 African nations for which data are available have per capita emission rates less than 0.1 metric ton of carbon per person per year.

What else affects the global climate?

Greenhouse gases are not the only things to affect the temperature of the atmosphere and the Earth. The sun's rays vary in strength. Periodic events called El Niño and La Niña alter the circulation of warmer and cooler water in ocean currents, leading to changes in climatic patterns across large regions. Clouds reflect sunlight back into space and, in doing so, reduce the amount of energy that reaches the Earth. And when volcanoes erupt they produce tiny particles that also reflect light energy in this way. Conversely, particles of black carbon or soot absorb heat. Transport fuels and burning forests and vegetation produce these particles, which scientists think have a warming effect about two-thirds as strong as that of carbon dioxide.

How much heat?

Global warming is just that – global. It refers to the worldwide average increase in temperature above a long-term average. The global average temperature rose by about 0.85 degrees between 1880 and 2012, and the rate of warming has accelerated over the past 50 years, according to the Intergovernmental Panel on Climate Change.²⁵ Global averages mask big differences in warming between regions. In general there is more warming over land than the oceans and more warming at the poles than in the tropics. Global warming does not increase at a constant rate. From year to year the global average temperature can increase or decrease, but over decades the warming trend is clear. The reasons for these variations include the fact that much of the excess heat that greenhouse gases trap moves into the oceans, including into deep waters.

How much more heat?

Climate sensitivity is the term scientists use to explain how much the temperature will change because of the factors that affect the climate system. One of the main ways to understand climate sensitivity is to ask how much the temperature will rise if the concentration of the greenhouse gas carbon dioxide doubles to 560 parts per million (ppm) from 280 ppm, the level it was before the Industrial Revolution. On current trends, this will happen between 2050 and 2070. Scientists differ in their estimates of how much the world will warm as a result. The Intergovernmental Panel on Climate Change's Fifth Assessment Report said in 2013 that this figure was "likely to be in the range 2°C to 4.5°C with a best estimate of about 3°C, and is very unlikely to be less than 1.5°C."²⁶

24 Boden, T.A., G. Marland, and R.J. Andres. 2011. Global, Regional, and National Fossil-Fuel CO₂ Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, United States (http://cdiac.ornl.gov/trends/emis/tre_afr.html).

25 See T. Stocker et al. (eds.), 2013, *Climate Change 2013. The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers*. (http://www.climatechange2013.org/images/uploads/WGL_AR5_SPM_brochure.pdf).

26 See T. Stocker et al. (eds.), 2013, *Climate Change 2013. The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers*. (http://www.climatechange2013.org/images/uploads/WGL_AR5_SPM_brochure.pdf).

Three important ways global warming creates problems

Rising temperatures have three important effects that create problems.

Erratic precipitation

Where, when and how much rain falls can affect people's health and livelihoods, and too much or too little precipitation can have devastating effects. Until recently, rain and snow fell in fairly regular patterns that determined, among other things, when farmers plant and harvest crops. But as the oceans and atmosphere have warmed, both the amount of water evaporating and the amount of moisture the air can hold have increased. As a result, we can predict more overall rainfall as the planet continues to warm.

But what's true for one region may be just the opposite for another, leading to more extreme and less predictable precipitation. Most scientific rainfall models predict that high latitude countries, as well as tropical East Africa, will receive more precipitation, while the Amazon Basin, Mediterranean and North Africa, Central America, the Southern Andes, and parts of Australia are likely to receive less. Complex climate phenomena such as the South Asian and West African monsoons are proving harder to model, and for many tropical and subtropical countries, scientists have less confidence in their predictions.

Extreme events

Heat waves, tropical cyclones, extreme rainfall, floods, wildfires and droughts are all examples of natural disasters that may or may not become more common as our climate changes. In 2011, the Intergovernmental Panel on Climate Change (IPCC) produced a special report on such events.²⁷ It noted that while there is evidence that some extremes have changed since the 1950s, scientists are unsure how much these changes reflect a new reality for different regions and extremes (see Box: Attribution, or "is it climate change?"). That said, climate scientists do predict that climate change will lead to more extreme weather events.

Extreme rainfall raises the risk of soil erosion, landslides and flooding, which can threaten agricultural productivity and infrastructure, posing serious threats to people's economic and physical security. Floods can also contaminate water supplies and increase the likelihood of water-borne disease, such as cholera. By contrast, too little rainfall can lead to droughts, which can devastate crops and livestock, deplete food supplies and increase the risk of wildfires. According to the 2011 IPCC report on extreme events, in the past 60 years, some regions including West Africa, have experienced

27 C.B. Field, et al., 2011, *Managing the risks of extreme events and disasters to advance climate change adaptation*. Special report of the Intergovernmental Panel on Climate Change. (http://www.ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf).

more intense and prolonged droughts, whereas regions such as central North America have actually experienced less frequent and less intense droughts than they did in the middle of the 20th century.

Rising seas

Several factors affect sea levels and climate change contributes in two key ways. First, higher atmospheric temperatures lead to higher ocean temperatures, and as water warms its molecules expand, increasing its total volume. Second, rising temperatures also cause glaciers and ice sheets to melt, adding to the total amount of water in the world's oceans. In July 2013, the World Meteorological Organization reported that that global average sea level rise during the decade 2001-2010 was 3 mm per year, almost double the observed 20th century trend of 1.6 mm per year.²⁸ Rising seas increase the risk of coastal erosion and floods, which can cause immediate physical damage and injury, threaten health with water-borne diseases, and contaminate drinking water and agricultural land with salt. Small islands and low-lying areas of coastal countries are especially at risk, but this problem is ubiquitous: one in ten people on Earth — some 634 million — live fewer than ten meters above sea level.²⁹ In Africa, the Niger and Nile Deltas are among the areas most at risk from rising sea levels as they are low-lying, and important centres of both food production and human settlements that are home to millions of people.

Attribution, or “is it climate change?”

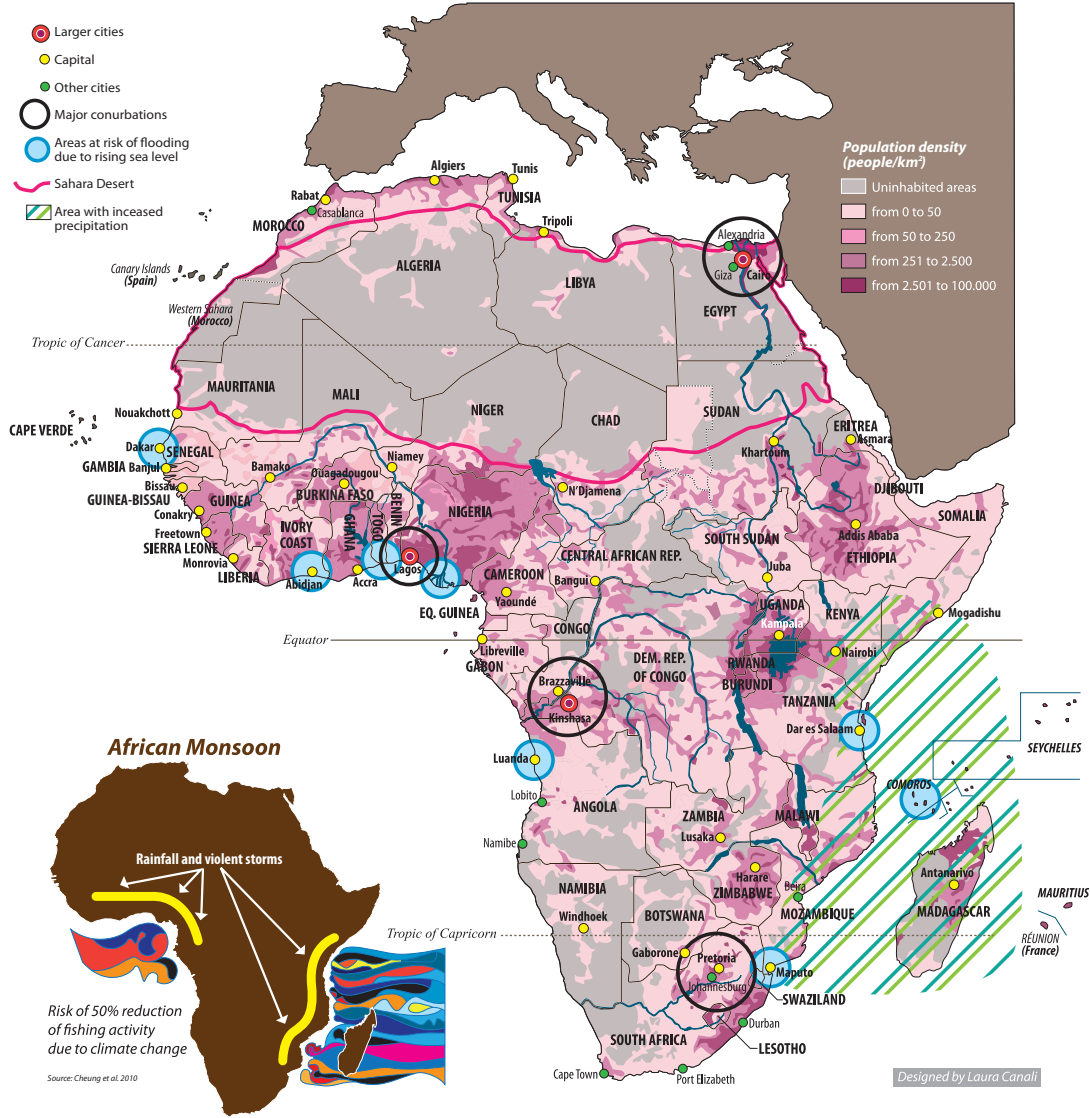
It is difficult to prove scientifically that any single event is the result of the climate change. Journalists can therefore rarely say for sure whether human activities have made a specific drought or flood or major storm more likely, or whether the event is just part of a natural pattern. However, many extreme events that have occurred already are consistent with what scientists predict climate change will bring, so journalists can always explain individual events in terms of what scientists say about the changing likelihood of such events. As science advances, it may become easier for scientists to demonstrate whether individual events are linked to climate change. In 2012, researchers published a paper that claimed climate change influenced the 2011 drought in East Africa, but that the failure of the 2010 rains was because of natural factors and not climate change.³⁰

28 See World Meteorological Organization, 2013, *The Global Climate 2001-2010, A Decade of Climate Extremes* (http://library.wmo.int/pmb_ged/wmo_1119_en.pdf) and the associated press release (http://www.wmo.int/pages/mediacentre/press_releases/pr_976_en.html).

29 G. McGranahan, 2007, The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization* 19. Pp. 17-37. (<http://eau.sagepub.com/content/19/1/17.full.pdf+html>)

30 See F. C. Lott, et al., 2013, Can the 2011 East African drought be attributed to human-induced climate change? *Geophysical Research Letters* 40, pp. 1177-1181.

VISUALISING A WARMING WORLD RISING SEA LEVELS ARE AFFECTING AFRICAN CITIES



Sources:
Turn Down the Heat - Climate Extremes, Regional Impacts and the Case for Resilience, World Bank, 2013
African Population Database, UNEP GRID Sioux Falls, Nelson, Andy, 2004



Visualising a Warming World: Rising Sea Levels are Affecting African Cities. Credit: Laura Canali & Connect4Climate, 2013

What climate change means for agriculture and food security

Although some aspects of African agriculture may benefit from climate change, rising temperatures and the extreme events they drive, such as droughts and floods, appear more likely to threaten crops and livestock across the continent. Climate change can have less direct effect too, by affecting the pollinators, pests, weeds and parasites. Together, these changes have already been linked to rising food prices, reduced food security, and increased malnutrition — three trends that show little signs of slowing. According to the IPCC, by 2020, up to 250 million Africans are likely to suffer from food insecurity as a result of climate-driven crop failure, loss of livestock, and a lack of water.³¹



Tea pickers in Kenya's Mount Kenya region. Credit: Neil Palmer/ CIAT

31 See the UNEP Factsheet *Climate Change in Africa – What is at stake?* (http://www.unep.org/roa/amcen/docs/AMCEN_Events/climate-change/2ndExtra_15Dec/FACT_SHEET_CC_Africa.pdf).

According to the World Bank, by 2040, drought and increased heat could reduce by 40-80 per cent the area of sub-Saharan Africa suited growing maize, millet or sorghum.³² It says a 2°C increase in temperature (projected for 2040), could reduce maize yields by 5 to 22 per cent, wheat by 10 to 17 per cent, and sorghum by 15 to 17 per cent. The Intergovernmental Panel on Climate Change has stated that the arid and semi-arid area of sub-Saharan Africa could expand by 60 to 90 million hectares – the size of France – by 2080.³³

The devastation extreme climatic conditions can cause is evident. The famine in Somalia that killed an estimated 260,000 people between 2010 and 2012 was the direct result of severe drought across the region.³⁴ Erratic rainfall and prolonged dry spells have sustained high food prices across the Sahel region, making it increasingly difficult for families to feed themselves.³⁵

Part 3 of this book describes how the agriculture sector can both adapt to and mitigate climate change.

Tea Production in Kenya³⁶

Over 500,000 Kenyans who rely on tea production for their income have seen erratic rainfall, greater frost in the winter, and higher summer temperatures harm their livelihoods. With a projected 2°C increase in temperature threatening to drive farmers up to forested mountain slopes to maintain production, the government has acknowledged the harmful impacts of climate change and is developing a plan for intervention.

32 World Bank, 2013, *Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience*. Washington DC, United States.
 33 M. Boko, et al., 2007, *Africa, Climate Change 2007: Impacts, Adaptation and Vulnerability*. In: M. Parry, et al., (eds.) *Contribution of Working Group II, Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, pp. 433–467. Cambridge University Press, Cambridge.
 34 See this BBC news story entitled 'Somalia famine 'killed 260,000 people' (www.bbc.co.uk/news/world-africa-22380352).
 35 See IFPRI, 2012, *Global Food Policy Report*. International Food Policy Research Institute, Washington DC., 142 pp. (<http://www.ifpri.org/sites/default/files/publications/gfpr2012.pdf>)
 36 See FAO, 2013. *Climate Change and Tea in Kenya: Impact Assessment and Policy Response*. Food and Agriculture Organization of the United Nations, Rome, Italy. 6 pp. (www.fao.org/fileadmin/templates/est/Climate_change/kenya/Project_brief_Kenya-EN_FINAL.pdf)

How climate change can affect human health

The World Health Organization (WHO) estimates that, since the 1970s, climate change has been responsible for over 140,000 extra deaths worldwide each year.³⁷ As well as the immediate dangers that heat waves, floods and storms can cause, rising temperatures and extreme weather events also pose longer term threats. The WHO notes that these include:

- **Hunger and malnutrition:** As the climate so heavily influences agriculture, changes that reduce yields can threaten food security. In the late 20th century, the Sahel region experienced one of the worst famines in history due to decades of crippling drought; in 2011, drought in East Africa killed at least 50,000 people.
- **Water-borne diseases:** Climatic conditions strongly affect water-borne diseases such as cholera, which cholera thrives during periods of increased rainfall. If these conditions intensify with climate change as projected, scientists expect to see more outbreaks, particularly in areas with poor sanitation or where flooding has occurred.
- **Vector-borne diseases:** Climate change's impact on diseases such as malaria and is not yet clear. Warmer temperatures may affect the life cycle of mosquitoes in ways that facilitate their transmission of diseases. In too hot and dry a climate, though, mosquitos cannot survive. Other diseases such as Rift Valley Fever – caused by a virus that mosquitoes transmit to people – are projected to increase in prevalence.

Part 5 of this book includes tips for reporting on climate change and health.

37 See the World Health Organization's fact sheet on climate change and health, reviewed in November 2013. (<http://www.who.int/mediacentre/factsheets/fs266/en/>)

What is climate change going to cost?

The economics of climate change is a new field, and one that is complicated by the difficulty of saying for sure if a specific event is due to climate change or natural variation. Estimates of what climate change will cost vary greatly – but are all big, running to hundreds of billions of dollars per year. Experts tend to agree with the 2007 Stern Review on the Economics of Climate Change, which said the costs of doing nothing would be much higher.³⁸ The costs of climate change will include:³⁹

- Direct damage to infrastructure and crops from extreme weather events such as floods, storms and droughts. Since 1980, the economic damages of weather-related disasters around the world has totalled over an estimated US\$1 trillion.⁴⁰
- Loss of lives.
- Costs of tackling health problems such as disease outbreaks and the injuries people sustain in extreme events.
- Loss of ecosystem services – such as crop pollination by insects.
- Costs of mitigating climate change and moving towards low-carbon economies.
- Costs of adapting agriculture, health and other sectors to the impacts of climate change.

Counting the cost of climate change in Namibia⁴¹

When most of a country's wealth is in the wild, shifts in natural systems can wreak havoc with its economy. Namibia is a case in point. Its natural legacy underpins much of the national bank balance — and also leaves it highly vulnerable to the impacts of climate change. In fact, research by ILED suggests the impacts on natural resources alone could reduce the country's GDP by 1 to 6 per cent. Employment opportunities could shrink and wages fall, with incomes for unskilled labour dropping by 24 per cent in a worst-case scenario. So along with 'climate-proofed' policies and activities, Namibia needs a strategy to deal with displaced farmers and farmworkers.

In 2007, the Intergovernmental Panel on Climate Change projected that climate change could reduce GDP across Africa by 2 to 4 per cent by 2040, a figure that could climb up to 10 or even 25 per cent by 2100⁴². Small-scale farmers would be the most heavily impacted, with crop revenues falling by as much as 90 per cent by the end of the century, and drought expansion costing up to US\$26 billion in dry-land losses. A 2009 report that Christian Aid produced summarised studies that concluded that:⁴³

38 N. Stern, 2006. *Stern Review on the Economics of Climate Change*. HM Treasury, London. (http://www.hm-treasury.gov.uk/stern_review_report.htm)

39 C.B. Field, et al., 2011, *Managing the risks of extreme events and disasters to advance climate change adaptation*. Special report of the Intergovernmental Panel on Climate Change. (http://www.ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf).

40 Munich Re, 2013, North America most affected by increase in weather-related natural catastrophes. Press release, 17 October 2013. (http://www.munichre.com/en/media_relations/press_releases/2012/2012_10_17_press_release.aspx).

41 H. Reid, et al., 2007, Counting the cost of climate change in Namibia. International Institute for Environment and Development. (<http://pubs.iied.org/17026IIED.html>)

42 IPCC, 2007, *Climate Change 2007: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC, Geneva, Switzerland (http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm).

43 R. Clements, 2009, *The Economic Cost of Climate Change in Africa*. Christian Aid, London, 44 pp. (<http://www.christianaid.org.uk/images/economic-cost-of-climate-change-in-africa.pdf>)

- In Cameroon, a 14 per cent reduction in rainfall was predicted to cause losses of US\$4.65 billion. A seven per cent reduction in rainfall would reduce the country's net revenue by six and a half per cent per hectare.
- In Ethiopia, marginal temperature increases will reduce net farm revenue by up to US\$997 per hectare.
- In Zimbabwe, a 3.3°C increase above temperatures experienced before the Industrial Revolution would decrease annual farm revenues by US\$0.4 billion.

The costs of climate change in coastal Egypt⁴⁴

Researchers have estimated that a 50 centimetre increase in sea level would cause losses of US\$2.5 billion in Egypt's Port Said Governorate. The same increase in sea level would flood 30 per cent of Alexandria, which is home to four million people and 40 per cent of Egypt's industrial sector. The economic costs of such an impact are estimated to be in the range of US\$30 billion. A report commissioned by the Organisation for Economic Co-operation and Development (OECD) estimates the economic costs of damage to port cities from flooding, storm surge and high winds caused by climate change. It indicates that in Alexandria alone, US\$563.28 billion of assets could suffer damage or be lost because of coastal flooding alone by 2070. It says coastal adaptation would cost upward of US\$1.7 billion in Port Said and US\$2 billion in Alexandria.

Costs of adapting to climate change

In 2013, the UN Environment Programme published a report that estimated the annual cost of adaptation across Africa would be US\$7-15 billion by 2020.⁴⁵ This figure could rise to US\$150-350 billion by 2070 without rapid global cuts in greenhouse gas emissions. Of course, estimates are just that. Past trends can give us insight into what projected costs will look like, but changing conditions and external factors will inevitably drive experts to update their findings. What we do know is that climate change has already cost the world trillions of dollars, not to mention the environmental damage and lives lost.

Climate finance

Much of the money needed for activities that mitigate and adapt to climate change in Africa will have to come from public and private sources in industrialised countries. This is a principle with which all parties to UN Framework Convention on Climate Change (UNFCCC) have agreed. The UNFCCC has set up four funds: The Least Developed Countries Fund; the Special Climate Change Fund; the Adaptation Fund and the Green Climate Fund.

The Global Environment Facility, the World Bank, European Commission and other donors also have a number of other climate funds, such as the World Bank's Carbon Finance Unit, which uses money from governments and companies in OECD countries to pay for project-based greenhouse gas emission reductions in non-OECD countries. The World Bank's Climate Investment Funds are made up of four funding windows to help developing countries pilot low-emissions and climate-resilient development.⁴⁶

- The Pilot Program for Climate Resilience, with US\$1.3 billion pledged as of mid-2013, includes projects in Mozambique, Niger and Zambia.
- The Forest Investment Program, with US\$639 million pledged as of mid-2013, includes projects in Burkina Faso, Democratic Republic of Congo and Ghana.
- The Clean Technology Fund, with US\$5.2 billion pledged as of mid-2013, includes projects in Egypt, Morocco, Nigeria and South Africa and Tunisia.
- The Program for Scaling Up Renewable Energy in Low Income Countries, with US\$505 million pledged as of mid-2013, includes projects in Ethiopia, Kenya, Liberia, Mali and Tanzania.

The private sector also plays a role in climate finance — through investments in renewable energy projects and planting trees, for instance. So far, however, finance from all of these sources is just a small fraction of what will be needed.

44 R. Clements, 2009, *The Economic Cost of Climate Change in Africa*. Christian Aid, London, 44 pp. (<http://www.christianaid.org.uk/images/economic-cost-of-climate-change-in-africa.pdf>)

45 UNEP, 2013, *Africa's Adaptation Gap*. UN Environment Programme Nairobi, Kenya. (<http://unep.org/pdf/AfricaAdapatationGapreport.pdf>)

46 See <https://www.climateinvestmentfunds.org/cif/>

Climate change and conflict?



Internally-displaced people on the road, Sudan. Credit: UN Photo/Tim McKulka

While the physical and economic impacts of climate change are (at least, relatively) well documented, experts are still grappling with the political. Until recently, few academics, government officials, development workers or journalists thought to link

rising sea levels, shifting weather patterns, and environmental degradation with security, despite the strong evidence that conflict over natural resources can fuel violence and war.

In recent years, few African regions have been immune to climate-driven resource pressures. Erratic rainfall has contributed to communal conflict across sub-Saharan Africa.⁴⁷ In Eastern Africa in particular, drought and livestock diseases have sparked 'range wars'.⁴⁸ A 2009 UNEP report stated that "the potential consequences of climate change for water availability, food security, prevalence of disease, coastal boundaries, and population distribution may aggravate existing tensions and generate new conflicts".⁴⁹

In 2009, a Columbia University study found a strong correlation between temperature and conflict in sub-Saharan Africa between the years of 1980 and 2002, with a 50 per cent increase in the likelihood of conflict for every 1°C above the average temperature, a correlation stronger even than that between conflict and diminished rainfall. With temperatures on track to rise by at least 1°C by 2030, the continent faces a very serious threat of prolonged civil war in the decades to come.⁵⁰ Climate change is best thought of as a "threat multiplier" – not necessarily a catalyst of conflict, but rather an accelerator.

47 H. Fjelde & N. von Uexkull, 2012, Climate triggers: Rainfall anomalies, vulnerability and communal conflict in Sub-Saharan Africa. *Political Geography* 31, pp. 444–453. (<http://www.sciencedirect.com/science/article/pii/S0962629812001072>)

48 See C. K. Butler & S. Gates, 2010, African Range Wars: Climate, Conflict, and Property Rights. Paper prepared for presentation at "Climate Change and Security", 250th Anniversary Conference organized for the Royal Norwegian Society of Sciences and Letters. (<http://climsec.prio.no/papers/ButlerGates2010CLIMSEC.pdf>)

49 UNEP, 2009, *From Conflict to Peacebuilding: The Role of Natural Resources and the Environment*. UN Environment Programme, Nairobi, Kenya. 44 pp. (http://postconflict.unep.ch/publications/pcdmb_policy_01.pdf)

50 See C. Onda, 2009, The Effect of the Spatial Resolution of Conflict Data on the Analysis of Drought As a Local Determinant of Civil War Onset: Africa, 1980 – 2001. *Consilience: The journal of sustainable development*. <http://www.consiliencejournal.org/index.php/consilience/article/view/7>

Climate change and migration?

Though there is disagreement about terminology – some use politically loaded terms such as “climate refugees” -- the concept of climate migration has been loosely defined as the forced displacement of individuals or groups by sudden or gradual changes in their environment that adversely affect living conditions. The factors behind climate migration are numerous, and diverse: these “sudden or gradual changes” can include rising sea levels eroding the land beneath coastal communities, the desertification of farmland, or the major damage and flooding that a tropical cyclone can inflict. Water scarcity, too, represents a major threat to human development and security that is certain to exacerbate as temperatures rise. Almost 40 per cent of Africans live in water-scarce environments; by 2030, a lack of water is projected to displace upwards of 24 million people.⁵¹

Research shows that most migrants who move to avoid environmental problems do so for relatively short distances and durations, and that the poorest and most vulnerable people are the least likely to move.⁵² While some governments see migration as a problem and something to discourage, for the migrants themselves movement is a form of adaptation to climate change.

Climate migration can be short-term or long-term; an annual movement to cope with yearly flooding, or a sudden response to a natural disaster that has wiped out an entire town. As with many trends, it is impossible to assign total causation for the migration of peoples to climate change; many other social, political, and cultural factors are always involved.

Throughout much of Africa, climate migration is driving urbanisation, one of the defining features of Africa's shifting demographics. According to the UN, by 2050, Africa's urban population will jump from 414 million to 1.2 billion people.⁵³ While urbanization can propel economic growth, an explosive growth in urban populations can place a strain on cities' limited resources, and further exacerbate existing stresses. In particular, climate change is expected to further increase the number of Africans living in slums: as of 2010, 61.7 per cent of sub-Saharan Africa's urban population were slum-dwellers, more than anywhere else in the world.⁵⁴ The crowding of African slums, many of which are low-lying and thus themselves prone to flooding, is in turn likely to increase vulnerabilities to malnutrition, poor sanitation, air pollution, and disease.

51 See <http://www.un.org/waterforlifedecade/scarcity.shtml>

52 See IIED, 2009, Radical shift needed to end alarmism over climate-related migration. Press release, 24 June 2009 (<http://www.iied.org/radical-shift-needed-end-alarmism-over-climate-related-migration>).

53 United Nations, 2011, Africa and Asia to lead urban population growth in the next four decades. UN press release, 4 April 2011. (http://esa.un.org/unup/pdf/WUP2011_Press-Release.pdf)

54 See K. Racelma, 2012, Towards African cities without slums. African Renewal online. (<http://www.un.org/africarenewal/magazine/april-2012/towards-african-cities-without-slums>).

Where migration and conflict meet

In Northwest Africa, one can see the growing nexus between climate and international security. Migrant workers have long made the trek from Nigeria to Niger, Algeria, and Morocco. But, according to a Center for American Progress report, not only do these migrants face heightened threats of drought, flooding, and coastal erosion as they cross through the Sahel, one of the regions most affected by climate change in the entire world, they also have seen their numbers swell in size. As a result, migrants have increasingly come into violent contact with insurgents in Nigeria and Algeria, a trend that will likely continue without major policy intervention.⁵⁵

Darfur: Ecological disaster first?

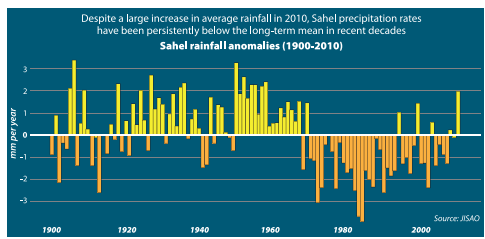
The genocide in Sudan's Darfur region, where the United Human Rights Council estimates that up to 400,000 have been killed, has prompted some analysts to label the situation the world's "first climate change war."⁵⁶ While experts will disagree over the extent to which we should attribute the conflict to climate change, the region has been plagued by a severe reduction in rainfall since the disastrous drought of 1984. This has driven fierce competition for a shrinking pool of resources. In 2007, UN Secretary-General Ban Ki-Moon released a statement blaming climate change for the trend of pastoralist communities migrating southward to seek new means of livelihoods.⁵⁷ Not only has such migration placed these refugees directly in the path of armed conflict, but it is also contributing to new ecological problems, as refugees' search for fuel-wood and water has led to deforestation and depletion of aquifers in and around their camps.

55 See M. Werz & L. Conley, 2012, *Climate Change, Migration, and Conflict in Northwest Africa*. Center for American Progress, Washington, DC., United States. <http://www.americanprogress.org/issues/security/report/2012/04/18/11439/climate-change-migration-and-conflict-in-northwest-africa/>

56 See D. Biello, 2009, Can climate change cause conflict? Recent history suggests so. *Scientific American*. 23 November 2009. (<http://www.scientificamerican.com/article.cfm?id=can-climate-change-cause-conflict>).

57 See Ban Ki Moon, 2007, A climate culprit in Darfur. *Washington Post*. 16 June 2007 (<http://www.washingtonpost.com/wp-dyn/content/article/2007/06/15/AR2007061501857.html>)

VISUALISING A WARMING WORLD FOOD PRODUCTION AT RISK AND POPULATION MOVEMENT IN AFRICA



Sources:
Turn Down the Heat: Climate Extremes, Regional Impacts and the Case for Resilience, World Bank, 2013
Atlas of the World, 8th Edition, National Geographic 2005
Fronte del Sahara, Limes, la rivista italiana di geopolitica, 2012
Calendario Atlante, De Agostini, 2012

Designed by Laura Canali



Visualising a Warming World: Food Production at Risk and Population Movement in Africa. Credit: Laura Canali & Connect4Climate, 2013

Part Three: Solutions in-depth

How can we limit climate change?

Efforts to reduce the concentration of greenhouse gases – either by removing them from the atmosphere or stopping them entering it in the first place — are broadly termed “mitigation”. As major sources of greenhouse gases, the energy, forestry and agriculture sectors are those in which much mitigation can happen.

Being paid to plant and protect forests (REDD+)

The world’s forests are crucial to efforts to limit climate change because they absorb carbon dioxide from the air and store it for long periods in soil and plant tissues. Cut down or burn a forest and this carbon will enter the atmosphere and trap more heat. One initiative that aims to reduce this threat is called Reduced Emissions from Deforestation and (forest) Degradation (or REDD+). The basic idea is to compensate nations that forgo development opportunities when they conserve, restore or enhance their forests.

Under a REDD+ scheme, countries could gain credits for reducing emissions in this way. These credits could be sold on international carbon markets, compensated through a fund paid by developed nations or, as looks most likely, paid using a combination of both approaches. REDD+ is likely to be central to the global strategy for addressing climate change that governments are negotiating under the UN Framework Convention on Climate Change. Already many countries are implementing REDD+ projects or preparing to do so. The challenges REDD+ schemes must overcome include:

- Measuring ‘reference levels’ of how much carbon an area of forest stores.
- Calculating how this baseline level would change under a ‘business as usual’ scenario.
- Designing projects that ensure less carbon is lost.
- Ensuring laws protect local land rights.
- Developing social and environmental safeguards to ensure that REDD+ does not harm local communities – e.g. through land grabs – or biodiversity.
- Ensuring that preventing deforestation in one place does not encourage it elsewhere (known as leakage).
- Ensuring that elites and corrupt officials do not capture REDD+ money that flows to forest nations.

As yet, there is no agreed method for measuring carbon. Even if there were, few forest nations have the resources needed to make such measurements, which will require historical data, satellite imagery and direct measurement of trees, as well as an international system for reporting and verifying the data, which comes from often hard-to-reach locations. Finally, there are also concerns that REDD+ could flood the market with carbon credits and lead to a crash in the price of carbon that creates a disincentive for other activities – such as renewable energy projects – that would also help mitigate climate change.

If REDD+ is going to move forward as a formal mechanism, it will need to involve networks of local communities in determining how plans are interpreted locally and in managing activities such as monitoring and policing. Geographical

isolation, language differences and contested rights over land are among the issues that need to be addressed. In some cases this will require significant changes in policy to allow communities a greater voice in governing their forests. UN and World Bank programs and non-profits around the world are looking at ways to do this.

Until governments of the world agree a REDD+ system under the UN climate change convention, activities are being organized through other initiatives such as the UN-REDD programme, the World Bank's Forest Carbon Partnership Facility, Forest Investment Program, and Global Environmental Facility. As REDD+ has not been formally agreed in an international treaty, forested countries have not all adopted it. So far, the UN-REDD program consists of 47 partner countries of which 18 are in Africa.

REDD+ in Africa

The Congo Basin countries of Cameroon, Central African Republic, Democratic Republic of Congo, Republic of Congo, Gabon, Uganda and Zambia are all REDD partner countries in one of the programs listed above. Other African nations to have initiated REDD programs include Benin, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Mozambique, Nigeria, Sudan, South Sudan and Tanzania. Burkina Faso, Burundi, Cote d'Ivoire, and Togo are all in the process of entering REDD schemes. According to the Climate Investment Funds Update for 2012,⁵⁸ REDD projects accounted for 9.6 per cent of all climate funding to sub-Saharan Africa. This comprised 73 REDD projects, for which US\$235.8 million have been committed and US\$68.9 million disbursed. UN-REDD is the largest funding source for REDD projects with USD\$24.2 million approved and US\$19.1 million disbursed to a total of five projects. Half of Africa's REDD+ finance flows into the Congo Basin.



Patrice Metennou, researcher for CIFOR interviews a charcoal maker in central Cameroon. Credit: CIFOR/ Ollivier Girard.

Case Study: Kenya

Kenya's forest area has fallen from about 12 per cent of the country to 5.6 per cent in recent decades. It loses about 12,000 hectares to deforestation each year but is considered to have a low rate of forest loss – of about 0.31 per cent per year.⁵⁹ Kenya demonstrates how REDD's complex structure can both accelerate projects and make it hard for journalists to find information. In contrast to the Democratic Republic of Congo, which implements ten REDD+ demonstration projects through a top-down government process with support from UN-REDD, Kenya has 47 active projects even though it is not an official UN-REDD partner country.

Kenya submitted its REDD Readiness Plan Idea Note to the Forest Carbon Partnership Facility (FCPF) in 2008 and a grant agreement was completed in November 2009. Updates about the country's REDD progress are available through FCPF's website⁶⁰. Within two months of the FCPF approving Kenya's plan, the US-based company Wildlife Works Carbon began the Kasigau Corridor REDD project. This aims to protect

58 See <http://www.climatefundsupdate.org/>

59 See the Forest Resources Assessments of the Food and Agriculture Organization of the United Nations (<http://www.fao.org/forestry/fra/en/>).

60 See <http://www.forestcarbonpartnership.org/>

200,000 hectares of dryland forest that forms a corridor between two national parks, Tsavo East and Tsavo West. It was the first REDD project to receive credits for the carbon it stored through the Verified Carbon Standard, and the Climate Community and Biodiversity Standard.

The project sold some of the first tranche of 1.45 million voluntary carbon units – representing the same number of tons of stored carbon – to South Africa’s Nedbank, as part of the bank’s positioning of itself as a carbon-neutral company.⁶¹ This private-sector approach has demonstrated the ability to speed up the development of REDD activities but also shows a vulnerability to the volatility of the carbon market. Other REDD activities in Kenya receive finance from funds such as the Save the Mau Trust Fund, the Finnish Fund for Local Cooperation, the Critical Ecosystem Partnership Fund, the Clinton and Rockefeller Foundations and the Hyundai Carbon Fund.

Part 5 of this book provides tips for reporting on REDD+.

Climate-friendly energy

Using renewable energy instead of fossil fuels

Renewable energy refers to any form of energy that is natural and is not limited by the planet’s natural resources. Examples include wind, solar, hydro, wave and geothermal power, all of which produce energy without emitting significant quantities of greenhouse gases. These renewable energy supplies are growing in use as a result of greater investment, falling costs, the rising price of fossil fuels, and a mounting body of scientific evidence of the threats that climate change poses. In 2012, according to Bloomberg New Energy Finance,⁶² global investment in renewable energy came to US\$269 billion. By 2008, renewable energy sources accounted for over one-fifth of electricity generation in non-OECD countries (compared to 17 per cent in OECD countries).⁶³ The majority of energy from renewable sources comes from hydro-power stations, which use a dam to block the flow of a river and trap large volumes of water, to turn turbines that generate power.

Solar power is also taking off in Africa. In late 2013 its largest solar farm was a 15 megawatt plant in Mauritania⁶⁴ but there are plans to build a 155 megawatt development in Ghana,⁶⁵ and two 50 megawatt farms in South Africa.⁶⁶ Numerous barriers, both technical and financial, limit more widespread adoption of renewable energy in Africa. Among the efforts to overcome these barriers is the United Nations Decade of Sustainable Energy for All,⁶⁷ which runs from 2014-2024. Another is US President Obama’s “Power Africa” initiative, which will initially work with Tanzania, Kenya, Ethiopia, Ghana, Nigeria and Liberia to increase access to affordable and sustainable energy supplies.⁶⁸

61 See I. Esipisu, 2013, REDD a ‘False Solution’ for Africa. Inter Press Service news agency. 14 July 2013 (<http://www.ipsnews.net/2013/07/redd-a-false-solution-for-africa/>)

62 See keynote speech by Bloomberg New Energy Finance Chief Executive Michael Liebreich on Day 2 of the 2013 Bloomberg New Energy Finance Summit (<http://bnef.com/InsightDownload/7566/pdf/>)

63 See L. Weischer, et al., 2011, *Grounding Green Power: Bottom-up perspectives on smart renewable energy policy in developing countries*. World Resources Institute, Washington DC., United States. (http://pdf.wri.org/working_papers/grounding_green_power.pdf).

64 See Masdar unveils Africa’s largest solar PV plant. BusinessGreen.com. (<http://www.businessgreen.com/bg/news/2262607/masdar-unveils-africas-largest-solar-pv-plant>).

65 See Africa’s largest solar power plant to be built in Ghana. BusinessGreen.com (<http://www.businessgreen.com/bg/news/2229263/africas-largest-solar-power-plant-to-be-built-in-ghana>).

66 See Mainstream Renewable Power finalises €500m South African wind and solar deal. BusinessGreen.com (<http://www.businessgreen.com/bg/news/2224040/mainstream-renewable-power-finalises-eur500m-south-african-wind-and-solar-deal>).

67 See United Nations, 2012, UN General Assembly Declares 2014-2024 Decade of Sustainable Energy for All (<http://www.un.org/News/Press/docs/2012/ga11333.doc.htm>)

68 See African Development Bank, 2013, Power Africa Initiative. (<http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/power-africa-initiative>).

Ethiopia embraces renewable power

In November 2013, Ethiopia announced contracts for US companies to build three 100 megawatt solar power sites.⁶⁹ The projects are expected to create 2,000 jobs and inject millions of dollars into the Ethiopian economy. A month earlier Ethiopia opened the largest wind farm in Africa. At full capacity it will produce 400 million kilowatt hours of energy per year.⁷⁰ To date Ethiopia has only accessed two gigawatts of its green energy capacity, which includes an estimated 45 gigawatts of hydroelectricity capacity potential, 10 gigawatts of potential wind capacity, and 5 gigawatts of geothermal potential.

Energy Efficiency

Another way to limit emissions of greenhouse gases is to use energy more efficiently. A McKinsey study found that increasing energy efficiency in developing countries could lower energy demand by up to 25 per cent by 2020 – a reduction the size of China's entire energy consumption.⁷¹ Beyond the environmental benefits, these improvements would make energy cheaper to use. Energy efficiency can entail:

- The installation of regional 'smart grids.'
- Constructing buildings and retrofitting old ones to use less energy.
- Replacing light bulbs or stoves with more efficient ones.



Solar power panels generate energy for a renovated local administrative building, erected by the Government of Liberia. Credit: UN Photo/Christopher Herwig.

69 See Ethiopia: Corporation Approves 300mw Solar Project. AllAfrica.com (<http://allafrica.com/stories/201311111270.html>)

70 See Ethiopia flicks switch on Africa's largest wind farm. BusinessGreen.com (<http://www.businessgreen.com/bg/news/2303211/ethiopia-flicks-switch-on-africas-largest-wind-farm>).

71 McKinsey Global Institute, 2008, *Fueling sustainable development: The energy productivity solution*. McKinsey&Company. (http://www.mckinsey.com/insights/energy_resources_materials/fueling_sustainable_development).

Climate-smart energy in sub-Saharan Africa

Nearly 70 per cent of people in sub-Saharan Africa lack adequate access to reliable and affordable electricity.⁷² As African nations develop, climate change presents an opportunity to fill this energy gap without relying upon the fossil fuels that emit greenhouse gases. For this to happen, public and private sector players will need to coordinate their efforts to develop clean-energy supplies.

Viable options exist to power Africa using mini-grid and off-grid solar, wind, hydro, and biomass technologies. Projects that use solar panels or small-scale hydro power to provide schools and villages with power demonstrate what is possible, but the challenge is in scaling up these solutions to meet demands across the continent.

A lack of infrastructure, funding, and comprehensive vision all threaten to hinder such efforts. Successful efforts to improve energy efficiency can happen on a larger scale (for example, installing new national power grids), or simply involve replacing light bulbs and appliances in homes.

- Between 2004 and 2011, South Africa saved 1,800 megawatts – enough to power the city of Durban — after the energy company Eskom distributed 43.5 million compact fluorescent light bulbs.⁷³
- Across Africa, most people rely on traditional fuels such as wood, biomass, or charcoal for cooking.⁷⁴ Smoke from these stoves not only threatens public health, but also contributes to climate change as it contains the greenhouse gases carbon dioxide and methane. Clean cook-stoves can dramatically reduce fuel consumption, significantly reduce indoor air pollution, and improve livelihoods.⁷⁵

Unfortunately, work to upgrade sub-Saharan's energy sector will not be cheap: a World Bank study finds that doing so may cost up to US\$40 billion per year for a decade.⁷⁶ On the other hand, reforming power utilities to run more efficiently could save up to US\$3.3 billion per year.

Biofuels: Win-win or risky business?

Biofuels are fuels made from living things or their waste products. They include solid biomass such as wood or charcoal; biogas (methane produced from sewage); and liquids such as bioethanol and biodiesel, derived from crops such as maize, sugarcane, soybeans and jatropha. While biofuels do emit some greenhouse gases when they burn, the plants from which they are created absorb carbon dioxide from the atmosphere as they grow. So they appear to offer a means to provide power in a more climate-friendly way than fossil fuels.

Their proponents argue that, especially across the Africa, there is ample opportunity to grow biofuels and traditional food crops with little conflict, thus allowing the continent to simultaneously use unproductive or idle land and profit off a new export commodity. Opponents argue that many biofuels are bad for the climate as the process of growing materials to convert into some biofuels are, ironically, fossil-fuel intensive. Some critics of biofuels claim that they are not in fact compatible with food production. A recent Oxfam report claims that the land now being devoted to biofuel production could have fed up to one billion people.⁷⁷ Others warn that investors, keen to profit from the biofuel rush, have leased large areas of land that local communities had lived and worked upon as their own.⁷⁸

Still, many experts are hesitant to write off biofuels altogether, and point to the need for further research. New forms of biofuels, such as those that use algae to capture carbon dioxide from the atmosphere, do show promise, though they remain in an early stage of development.

72 See International Energy Agency, 2012, Access to Electricity (<http://www.worldenergyoutlook.org/resources/energydevelopment/accesstoelectricity/#d.en.8611>).

73 See South Africa goes for 'green' lighting. SouthAfrica.info (<http://www.southafrica.info/about/sustainable/energy-180111.htm>).

74 See B. Merchant, 2012. Charcoal kills 2 million people & vast swaths of forest every year. Can biofuel stop the carnage? Treehugger.com (<http://www.treehugger.com/renewable-energy/africa-cooking-charcoal-kills-millions.html>)

75 See Global Alliance for Clean Cookstoves. Clean cookstoves and climate change. (<http://www.cleancookstoves.org/resources/fact-sheets/cookstoves-and-climate-1.pdf>).

76 See <http://www.infrastructureafrica.org/flagship-report>

77 See Oxfam, 2012, Land sold off in last decade could grow enough food to feed a billion people – Oxfam. Press release (<http://www.oxfam.org.uk/media-centre/press-releases/2012/10/land-sold-off-in-last-decade-could-grow-enough-food-to-feed-a-billion-people>).

78 See J. Vidal, 2012, Land acquired over past decade could have produced food for a billion people. *The Guardian*. (<http://www.guardian.co.uk/global-development/2012/oct/04/land-deals-preventing-food-production>).

Reducing emissions from agriculture



A farmer tends to her crops in the Democratic Republic of Congo. Credit: CIAT/ Neil Palmer.

The UN Food and Agriculture Organization estimates that agriculture is responsible for about 14 per cent of global greenhouse gas emissions.⁷⁹ But by drawing upon several traditional farming principles in a modern-day context, agriculture currently has the potential to reduce up to 6 billion tons of carbon dioxide emissions by 2030.⁸⁰

Agro-ecology

Agro-ecology is the application of the ecological science to the study, design and management of sustainable agro-ecosystems. Farmers who practice agro-ecology draw upon their understanding of both the complex dynamics of their local ecologies and the diverse means of cultivating the landscape for human benefit. Though agro-ecological farms by their very nature vary based on surrounding environments, the concept broadly entails the reintegration of livestock crops, pollinators, trees, and water in ways that work resiliently with the landscape; crop rotation and the planting of multiple crops at once (intercropping) rather than one single crop (monoculture); a reliance on biological pest controls rather than chemicals; and the management of soil fertility. Not only does agro-ecology have the potential to revitalize farmland that has been devastated by the impacts of warmer temperatures and more industrial agriculture, agro-ecology actively fights climate change by capturing carbon from the atmosphere through the maintenance of healthy soil matter and the replanting of trees on deforested lands, and by rejecting carbon-intensive fertilizers and other toxic chemicals.

Soil fertility management

Indeed, soil fertility management in and of itself represents a key tool to shrink climate change's agricultural footprint. Today, too many farmers import fossil fuel-intensive fertilizers and pesticides that ultimately wreak havoc on soil fertility. By planting various indigenous crop varieties and cover crops, switching to organic fertilizers, and reducing soil tillage,

79 See FAO, 2012, *How to feed the world in 2050*. Food and Agriculture Organization of the United Nations, Rome, Italy. (http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf)

80 See Carbon War Room. Sustainable agriculture. (<http://www.carbonwarroom.com/sectors/agriculture/sustainable-agriculture>).

farmers can take steps to ensure the long-term sustainability of their land while contributing to the sequestration of carbon dioxide. In some regions, such as the African Sahel, where drought devastated cropland for over three decades, some farmers are even reversing desertification by reintroducing organic matter back into the ground, which in turn retains water and attracts termites that help the soil retain moisture.⁸¹

Urban farming

Although the vast majority of agriculture occurs in rural areas, residents of the world's cities have the ability to fight climate change while simultaneously promoting nutritional lifestyles and economic growth through urban farming, or the practice of developing micro-farms on small plots of land.⁸² In our increasingly globalized world, the domestic and international transportation of food is a major source of global greenhouse gas emissions. By allowing city-dwellers to grow their own food in the backyard, on their rooftop, or across the street, urban agriculture greatly reduces the need to deforest land for agricultural purposes and cuts out the fossil-fuel intensive process of getting food from the farm to the plate. And with 75 per cent of Africans, Asians, and Latin Americans located in city centres by 2020, urban residents can too be a powerful driver in the mitigation of climate change.⁸³

81 See L. Reynolds & D. Nierenberg, 2012, *Innovations in sustainable agriculture*. Worldwatch Institute, Washington DC, United States. 38 pp. (http://www.worldwatch.org/system/files/188%20climate%20and%20ag_FINAL.pdf).

82 See Climate Progress, 2012, How urban farming can transform our cities — and our agricultural system. (<http://thinkprogress.org/climate/2012/05/29/491271/how-urban-farming-can-transform-our-cities-and-our-agricultural-system/>)

83 See E. Kio, 2012, Breaking off the poverty chains: Urban farming in Nairobi, Kenya. The GCARD blog (<http://gcardblog.wordpress.com/2012/10/20/breaking-off-poverty-chains-case-urban-farming-nairobi-kenya/>).

How can we adapt to the impacts of climate change?

Adaptation refers to actions that countries, communities and companies can take to limit the threats climate change poses. In the long term, climate change can only be tackled by mitigation – steep cuts in greenhouse gas emissions – and the faster this happens the less adaptation will be needed. But even if all greenhouse gas emissions stopped today, the planet would continue to warm because greenhouse gases persist in the atmosphere for hundreds of years. This makes adaptation today all the more urgent. Adaptation actions range from large-scale infrastructure projects to small-scale community based initiatives. It includes research and action, information and changes to livelihoods, behaviours and business practices. The UN Environment Programme estimates that the costs of adaptation in Africa could reach US\$350 billion per year by 2070.⁸⁴

The Adaptation Fund

The Adaptation Fund was created under the UNFCCC's Kyoto Protocol and it generates finance by charging a two per cent levy on all transactions made through the protocol's Clean Development Mechanism. But with only about US\$157 million in the fund as of December 2013,⁸⁵ many other sources of finance will be needed to support adaptation across the developing world.

The fund is the first one that countries can — if they choose — access and spend without needing to apply through a third party such as the UN Development Programme. To do this a country must first have an accredited National Implementing Entity. Senegal became the first country to access the fund in this way when, in 2010, the Adaptation Fund's board approved its proposal for direct access to funding to tackle coastal erosion caused by rising seas.

Other projects the fund has supported⁸⁶ include:

- Promoting climate resilience in the rice sector in Madagascar;
- Developing agro-pastoral shade gardens for poor rural communities in Djibouti;
- Building resilient food security systems in Egypt;
- Reducing vulnerability of coastal communities in Tanzania;
- Enhancing community resilience to the impacts of climate change on food security in Mauritania; and

An adaptation programme on water and agriculture in Eritrea.

84 See UNEP, 2013, Africa climate adaptation costs could soar to USD \$350 billion annually by 2070 if warming hits 3.5-4°C UN report. Press release (<http://unep.org/newscentre/Default.aspx?DocumentID=2755&ArticleID=9705&l=en>)

85 See Adaptation Fund, 2013, The Adaptation Fund surpasses \$100 million fundraising target at COP19. Adaptation Fund press release. (<https://www.adaptation-fund.org/media/adaptation-fund-surpasses-100-million-fundraising-target-cop19>).

86 See <https://www.adaptation-fund.org/>

Adapting agriculture

Adaptations that can increase food production and minimize crop failure despite extreme and less predictable climate will be crucial. They include:

- Changes to crop and livestock varieties that tolerate more variable and extreme weather. In Zimbabwe, farmers have begun to use a new variety of maize that matures faster than traditional varieties, requires less water and produces two cobs instead of one. If one cob fails, the other still has a chance to develop.⁸⁷
- Improved systems for predicting climatic events and warning farmers of extremes. In Ghana, farmers are installing rain gauges to record of monthly rainfall and help to predict longer-term trends.⁸⁸ Niger plans to improve its climate observatory and early warning systems, and ensure that better information about the climate reaches farmers and others.⁸⁹
- Changes to ways of storing and transporting food. In parts of Malawi, famers have switched from storing grain in ground-level granaries to using smaller harvest bags which they can easily move to higher ground in the event of flooding.⁹⁰
- Changes to ways of managing water supplies, including collecting and storing rainwater.
- Index-linked insurance schemes that compensate farmers and pastoralists when certain climatic events occur, such as a pre-determined number of consecutive days without rain.⁹¹
- Diversification of livelihoods to include a greater variety of crops, or a mix of agriculture with other activities.⁹²
- Rearing ducks instead of chickens as they can survive floods,⁹³ and planting elephant grass along river banks to slow flood waters.⁹⁴
- Mozambique plans to reinforce rural roads and rehabilitate irrigation and drainage systems to withstand weather extremes and coastal flooding.

In 2010, the International Food Policy Research Institute analysed actions that ten African nations (Burundi, Democratic Republic of Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania, and Uganda) have taken, or planned to take, to adapt agriculture to climate change.⁹⁵ All ten countries included plans to use more drought-tolerant and early-maturing crops. All ten also planned to increase their use of renewable energy, as a way to adapt to depleting sources of biomass energy upon which most African nations depend heavily. Eight of the ten nations also highlight rainwater harvesting – either with dams or on a small-scale. Five other strategies appeared in more than half of the plans:

- Conserving and restoring vegetation in degraded and mountain areas;
- Reducing overall livestock numbers through sale or slaughter;
- Cross-breeding livestock or acquiring smaller livestock (such as sheep or goats);
- Adopting traditional methods to conserve forests; and
- Using community-based management programs for forests, rangelands, and national parks.

87 See M. Mwando, 2012, Zimbabwe turns to drought-resistant crops. Thomson Reuters (<http://www.trust.org/item/?map=zimbabwe-turns-to-drought-resistant-crops/>) and World Vision: Fast maturing, drought resistant seeds save family from hunger (<https://wvioaptus.wvi.org/africa/africaweb.nsf/05225371933be85642256f87004ae404/02eca0e05b9efd394225716c0051fbc7?OpenDocument>).

88 See E. Hall, 2012, *Rainfall Shifts and Rain Gauges: helping farmers adapt to droughts and floods*. Care International adaptation learning programme in Ghana (http://www.careclimatechange.org/files/adaptation/ALP_Ghana_Rainfall_Gauges_Nov12.pdf).

89 See African Development Bank, 2013, AfDB Cites African Countries' Integrated Climate Resilience Solutions in the Water Sector in CIF Global 2012 Annual Report. Press release (<http://www.afdb.org/en/news-and-events/article/afdb-cites-african-countries-integrated-climate-resilience-solutions-in-the-water-sector-in-cif-global-2012-annual-report-11539/>).

90 See WeAdapt.org. Audiovisual Tools for Community-Based Adaptation: Bridging the Meteorological Service and the work of the Red Cross, Malawi (<http://weadapt.org/placemarks/maps/view/808#/placemarks/maps/view/808>).

91 See A. Oppong-Ansah 2013, Insuring Ghana's smallholder farmers against the weather. Inter Press Service news agency (<http://www.ipsnews.net/2013/07/insuring-ghanas-smallholder-farmers-against-the-weather/>).

92 See E. Ngaanuma, 2011, *Empowered women lead on community-based adaptation to climate change*. Care International adaptation learning programme in Ghana. http://www.careclimatechange.org/files/adaptation/ALP_Ndebilla_Abanga_April2011.pdf

93 See WeAdapt.org. Audiovisual Tools for Community-Based Adaptation: Bridging the Meteorological Service and the work of the Red Cross, Malawi (<http://weadapt.org/placemarks/maps/view/808#/placemarks/maps/view/808>).

94 See WeAdapt.org. Audiovisual Tools for Community-Based Adaptation: Bridging the Meteorological Service and the work of the Red Cross, Malawi (<http://weadapt.org/placemarks/maps/view/808#/placemarks/maps/view/808>).

95 <http://www.oxfamblogs.org/fp2p?p=3283> and <http://www.ifpri.org/publication/strategies-adapting-climate-change-rural-sub-saharan-africa>

Large-scale investments in infrastructure like dams, irrigation and levees can provide major benefits by helping countries limit flooding, provide water for agriculture, and generate electricity if constructed and managed properly. At the opposite scale, the local knowledge of smallholder farmers attuned to their environments can also provide low-cost solutions to major questions about water management.

Genetically modified crops and climate change

A plant's genetic properties can determine if a crop will survive a drought, flood or extreme heat. Farmers have selectively bred crop varieties to exhibit favourable qualities since the dawn of agriculture over 10,000 years ago. Genetically modified (GM) crops are varieties that scientists have developed by altering the structure of their genetic material (DNA) to make them exhibit specific new traits. They were first grown commercially in 1996 and by 2012, farmers in 30 countries grew them on more than 170 million hectares.⁹⁶

The advantage of genetic modification is that new traits can be introduced into crops far faster and with more precision than by traditional plant breeding techniques. To achieve this, scientists either remove or deactivate genes from a crop's existing DNA, or insert new genes into the DNA. The new genes can come from plants that could normally breed with the modified crop or from a very different species (which can be another plant, a bacterium or even an animal). In the context of climate change, GM crops of interest include drought-tolerant varieties and salt-tolerant varieties, which can withstand coastal flooding, and drought-tolerant varieties.

Critics of GM crops fear that they will promote corporate control over agriculture. Others say GM crops could pose threats to human health or the environment, but there is no strong scientific evidence to support those claims.⁹⁷ There is also little evidence that GM crops will be able to boost yields in a changing climate, on the scale needed and at the price farmers can afford to pay. The Union of Concerned Scientists, for instance, doubts that there is a GM solution to drought tolerance: "Drought tolerance is a complex trait that can involve many different genes, corresponding to different ways the plant can respond to drought; genetic engineering can manipulate only a few genes at a time. And in the real world, droughts vary widely in severity and duration, affecting the crop at different stages of its growth, so any engineered gene will be more successful under some drought conditions than others."⁹⁸



Drip irrigation is one way to adapt agriculture to less reliable rainfall. Credit: ICRIAT.

96 See ISAAA, 2012, Global Status of Commercialized Biotech/GM Crops: 2012. *Brief 44-2012: Executive Summary* (www.isaaa.org/resources/publications/briefs/44/executivesummary/).

97 See J. Foley, 2013, Changing the global food narrative. *Ensa.com* (<http://ensia.com/voices/changing-the-global-food-narrative/>).

98 See UCS, 2012, High and Dry: Why genetic engineering is not solving agriculture's drought problem in a thirsty world. Union of Concerned Scientists. http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/genetic-engineering/high-and-dry.html

Adapting towns and cities

Globally, more people now live in cities than in rural areas, and African nations are urbanising fast. The UN Population Fund reports that most new urban population growth will occur in smaller towns and cities with populations under 500,000,⁹⁹ which have fewer resources to respond to the challenges of climate change.

Ways to adapt urban centres include:

- Creating new buildings and infrastructure to increased risks;
- Building seawalls to protect houses against coastal erosion, and dikes to carry water away during storm surges, as in coastal towns in Senegal.¹⁰⁰
- Planting mangrove forests to limit coastal erosion and protect communities from rising seas and storm surges as in Kenya.¹⁰¹
- Working with vulnerable people and settlements to find solutions that serve them;
- Preparing for disasters.
- Creating networks of waterways to absorb sudden influxes of seawater
- Using floating schools and other buildings in flood-prone communities as in the Masako slum of Lagos, Nigeria.¹⁰²
- Planting trees and roof gardens to reduce temperatures, provide shade and increase food security.
- Building multi-storey shelters to protect coastal communities during tidal surges and cyclones.
- Harvesting rooftop run off to boost water supplies in informal settlements, as in South Africa.¹⁰³
- Installing storm drains and raising walls around landfill sites to limit the risk of floods spreading diseases, as in Djibouti.¹⁰⁴

For people living in informal settlements, the relationship between city governments, community organization, and individuals is vital to adapting to climate change. Adaptation is all about the quality of local knowledge and of local capacity and willingness to act combined with support provided by higher levels of government and international agencies.

The degree to which cities adapt to the anticipated disruptions of climate change is going to be a major determinant of how humanity adapts because cities are now where most people are. Looking forward, there is a growing economic rationale that the resource efficiency of cities point the way to sustainability and climate resilience. High population density typically means lower per person cost of providing infrastructure and basic services and may also help to minimise people's effects on local ecosystems if land use is concentrated¹⁰⁵. However, cities draw together many of Earth's major environmental problems: population growth, pollution, overconsumption, resource degradation and waste generation. Paradoxically, the efficiency of cities may also hold our best chance for a sustainable future.

99 B. Cohen, 2006, Urbanization in Developing Countries: Current trends, future projections, and key challenges for sustainability. *Technology in Society* 28: 63-80.

100 See UNFCCC. Adaptation to coastal erosion in vulnerable areas (http://unfccc.int/secretariat/momentum_for_change/items/7093txt.php) and the associated video Adaptation to Coastal Erosion in Vulnerable Areas in Senegal (<http://vimeo.com/60441430>).

101 See J. Karuga. 2013. Mangrove conservation pays off for Kenya's coastal communities. Thomson Reuters (<http://www.trust.org/item/20130528101853-xznws>) and USAID, 2009, Adapting to coastal climate change: a guidebook for development planners. USAID, Washington, DC., United States (http://www.undp-alm.org/sites/default/files/downloads/usaaid_adapting_to_coastal_climate_change_-_a_guidebook_for_development_planners.pdf)

102 See Sky News, 2013, Nigeria: Floating School Built In Slum Makoko. (<http://news.sky.com/story/1068677/nigeria-floating-school-built-in-slum-makoko>)

103 See US Environmental Protection Agency. Harvesting rooftop runoff from RDP housing in South Africa: A pragmatic approach to supplement water supply while reducing flooding, soil erosion, and disease (http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display_abstractDetail/abstract/8668) and UNEP, 2009, Rainwater harvesting: a lifeline for human well-being. UN Environment Programme, Nairobi, Kenya (http://www.unwater.org/downloads/Rainwater_Harvesting_090310b.pdf). and International Rainwater Harvesting Alliance. *Rainwater Harvesting and Climate Changes: the African Experience* (http://ynccf.net/pdf/Adaptation/Rainwater_Harvesting_and_Climate_Changes.pdf).

104 See UNDP Adaptation Learning Mechanism page on Djibouti (<http://www.undp-alm.org/explore/eastern-africa/djibouti>).

105 B. Cohen, 2006, Urbanization in Developing Countries: Current trends, future projections, and key challenges for sustainability. *Technology in Society* 28: 63-80.

Adapting to urban flooding in African cities¹⁰⁶

Urban floods spread disease, interrupt schooling, and destroy houses, assets and livelihoods. Meanwhile, droughts and floods in rural areas have forced many people to migrate to towns and cities. Many of these new arrivals live in hazardous places, building their homes on floodplains, steep, unstable hillsides or on tidal flats. This can aggravate the flood risk by obstructing natural channels through which flood waters could seep away from urban centres. Efforts to adapt are underway in cities that include Accra (Ghana), Freetown (Sierra Leone), Kampala (Uganda), Lagos (Nigeria), Maputo (Mozambique) and Nairobi (Kenya). These include planting trees along river banks and using sand bags to limit the entry of water into urban areas, digging canals and trenches to manage the flow of floodwaters, and making sure waste does not block waterways and drains. These are mainly individual coping strategies at local community level. Support to local communities from governments and national disaster reduction organisations enables larger scale activity such as: using sand to elevate vulnerable areas; building dykes or trenches to divert water from houses; protecting structures with waterproof recycled materials; installing tanks on roofs to collect rainwater; and relocating housing to higher, more secure areas.

Part 5 of this book includes tips for reporting on adaptation.

106 Action Aid, 2006, Climate change, urban flooding and the rights of the urban poor in Africa. Key findings from six African cities. Action Aid, London, United Kingdom (<http://www.alnap.org/pool/files/urban-flooding-africa-report.pdf>)

Part Four: Climate change policies and plans

International treaties to tackle climate change

The international community created the UN Framework Convention on Climate Change (UNFCCC) in 1992 to prevent dangerous climate change. Under the Convention, nearly 200 nations agreed to protect the climate system for present and future generations according to their “common but differentiated responsibilities and respective capabilities”.

Parties to the convention agreed that the extent to which developing nations can meet their treaty obligations would depend on the extent to which developed countries provide finance and technology, and that developed countries “should take the lead in combating climate change and the adverse effects”. According to the agreement, “Economic and social development and poverty eradication are the first and overriding priorities of the developing country parties”.

The UNFCCC entered into force in March 1994. Each year since then a Conference of Parties (COP) to the UNFCCC has met to assess progress towards its goal and to negotiate new actions in light of improved knowledge about the threat climate change poses.

At each session of the international negotiations under the UNFCCC, the talks divide into several simultaneous streams, each of which focuses on specific aspects of the whole. This makes it hard for smaller and poorer nations to be present in each discussion as they tend to have smaller negotiating teams than the wealthier nations. Many argue that this system makes the talks inherently unfair. To help overcome this challenge, countries can join forces and negotiate together on common positions, as, for example, the Africa Group does. All African nations are also members of the G77/China block, which encompasses 132 nations. Most of the African countries are also members of the Least Developed Countries block, along with a few Asian nations and Haiti. Other negotiating blocks include the 43-member Alliance of Small Island States, the European Union, and the BASIC group (Brazil, South Africa, India and China).

A brief history of the UNFCCC's main impacts

The first major change came in 1997 at the third conference (COP3), when parties to the UNFCCC adopted the Kyoto Protocol. This agreement created the first and only legally binding targets for developed nations to reduce their emissions, as well as important international monitoring, reporting and verification mechanisms to enforce compliance.

The Kyoto Protocol obliged developed nations to reduce their emissions to an average of 5.2 per cent less than their 1990 levels, between 2008 and 2012 (the protocol's first commitment period). To help countries meet their targets, the protocol created ‘flexibility mechanisms’ – such as carbon trading and the Clean Development Mechanism, which allows industrialised nations to reach their targets by investing in emissions reductions in developing nations.

The Kyoto Protocol entered into force in 2005. From that year onwards, each COP has also served as the 'meeting of parties' to the Kyoto Protocol, meaning that there are two main sets of parallel negotiations taking place at each event. Two permanent subsidiary bodies that serve both the UNFCCC and Kyoto Protocol talks meet at least twice a year, once during the COP/MOP. One of these bodies focuses on implementation of the agreements while the other provides scientific and technological advice.

Parties to the UNFCCC have agreed that African nations, the Least Developed Countries and small island states are the most vulnerable to climate change. In light of this, another important milestone came in 2007 at COP7 in Marrakesh, when parties to the UNFCCC agreed that the Least Developed Countries (most of which are in Africa) would receive funding to produce National Adaptation Programmes of Action (NAPAs) to identify their most urgent needs to adapt to climate change.

Unlike other industrialised nations that are party to the UNFCCC, the United States did not ratify the Kyoto Protocol and so had no international commitments to reduce its emissions. The other developed countries that did ratify the protocol were legally bound to establish new targets for a second commitment period to begin when the first period ended in 2012. It soon became clear that the United States would never ratify the Kyoto Protocol, because it did not require major economies such as China and India to reduce their own emissions.

COP13 (Bali, 2007): The disconnect between the United States (the world's biggest historical contributor to climate change) and the rest of the industrialised parties to the UNFCCC, led to the creation of the Bali Action Plan at COP13. This opened a new negotiation track under the UNFCCC in an effort to bring the United States into line with other developed nations. Under the Bali Action Plan, parties to the UNFCCC pledged to reach agreement by the end of COP15 in Copenhagen in December 2009 in five main areas:

1. A shared vision of what parties to the Convention aim to achieve, including a long-term goal for emissions reductions;
2. Mitigation of climate change by reducing the atmospheric concentration of greenhouse gas emissions, including quantified 'commitments' from developed nations and nationally appropriate mitigation 'actions' (NAMAs) from developing nations, including through reduced emissions from deforestation and forest degradation (REDD).
3. Adaptation to impacts such as changing rainfall patterns, extreme weather events, rising sea levels and shifting patterns of disease;
4. Technology transfer and development to support both adaptation and mitigation; and
5. Finance and investment to pay for all of the above.

COP15 (Copenhagen, 2009): The negotiations failed to make necessary progress and the conference ended with only a weak agreement called the Copenhagen Accord, which placed no firm obligations on any countries to act. Moreover, because not every party to the UNFCCC accepted the accord, it remained unofficial. The Copenhagen Accord did, however, include some important aspirations. It called on industrialised countries to provide US\$30 billion to developing nations in 'fast-start finance' by 2012 to help them adapt to and mitigate climate change. Furthermore, it urged these countries to increase this figure to US\$100 billion a year by 2020. The Copenhagen Accord also recognised the scientific view that to avoid dangerous climate change, the average global temperature increase should not exceed 2°C above pre-industrial levels, and it invited countries to pledge non-binding action to reduce their emissions.

COP16 (Cancún, 2010): Parties to the UNFCCC agreed the Cancún Agreements, which built upon the contents of the Copenhagen Accord and brought them within the UNFCCC so that they were now formally agreed to by all parties. The Cancún Agreements also included plans to set up a climate adaptation framework, a Green Climate Fund, and a technology transfer mechanism. Despite these gains, the Cancún Agreements fell short of the new legally binding deal that parties were meant to agree to the year before, and did not include any new targets for emissions reductions under the Kyoto Protocol.

COP17 (Durban, 2011): Parties agreed to negotiate by 2015 a comprehensive new legal agreement to take effect in 2020. In effect, this meant that parties were extending by six years their 2009 deadline for forming a deal. They agreed that negotiations towards that new agreement would take place in a new stream of talks called the Ad-hoc Working Group on the Durban Platform for Enhanced Action (or ADP).

COP18 (Doha, 2012): Parties developed an amendment to the Kyoto Protocol, albeit one that countries would need to ratify before it entered into effect. It featured a second commitment period that would run from 2012 until 2020 but included fewer countries and emissions reductions than the original agreement.

COP19 (Warsaw, 2013): Parties agreed an “international mechanism for loss and damage”, which recognises that if mitigation does not take place quickly enough, and if countries cannot adapt to the resulting climate change, detrimental impacts will be inevitable. Developing countries want this mechanism to be a channel through which they can seek compensation from countries with high greenhouse gas emissions for this damage.

The next milestone conference will be COP21 in Paris in 2015, when parties are meant to agree on a comprehensive, legally binding global agreement.

Part 5 of this book includes tips for reporting on the UNFCCC negotiations.

What the UNFCCC requires African governments to do

Mitigation

Most African countries have such low levels of greenhouse gas emissions that mitigation is not a priority. And unlike industrialised nations that are party to the Kyoto Protocol, African countries do not have binding targets, to which to reduce their greenhouse gas emissions. But all countries are now expected to identify **Nationally Appropriate Mitigation Actions**,¹⁰⁷ which will attract international finance. These mitigation actions include efforts to reduce greenhouse gas emissions that arise from deforestation. Under the international REDD+ framework, countries can expect financial compensation for keeping or enriching their forest stocks. But to take part they must set up the systems to apply for, receive and manage funds as well as monitor and report on the state of their forests. Various governments in Africa are developing what are called **REDD-Readiness** frameworks and taking other actions in this sector. The Democratic Republic of Congo, for instance, has a well-established National Coordination for REDD, and is putting a National Forest Monitoring System in place. Another way that African nations are mitigating climate change is through renewable energy and improved energy efficiency. One source of international finance for such projects is the **Clean Development Mechanism**, which now has enabled activities in 18 African nations.

Adaptation

As most African nations have low total and per-capita emissions, their priority will be to adapt to the impacts of climate change, rather than taking steps to reduce their emissions. Each African country that is also on the UN list of Least Developed Countries has already produced a **National Adaptation Programme of Action (NAPA)**. This is a document that identifies the most urgent needs and puts a price tag on chosen adaptation projects. You can see the full list of NAPAs on the UNFCCC website.¹⁰⁸ All countries are now also supposed to prepare **National Adaptation Plans** to identify medium and long-term needs, and how to address them. The UNFCCC site has details of the work underway to produce these plans.¹⁰⁹ For examples of adaptation activities in specific countries see Part 3 of this book.

Communication, information and learning

All African nations that are party to the UN Framework Convention on Climate Change are obligated to make periodic reports about what they are doing, or plan to do, to implement the convention. These **National Communications** include information about emissions, vulnerabilities, financial resources, and public awareness of climate change. Most

107 See IISD Learning Centre. Developing Financeable NAMAs webinar series (<http://www.iisd.org/learning/course/category.php?id=18>).

108 See UNFCCC. National Adaptation Programmes of Action received by the Secretariat. (https://unfccc.int/adaptation/workstreams/national_adaptation_programmes_of_action/items/4585.php).

109 See UNFCCC. National Adaptation Plans. (https://unfccc.int/adaptation/workstreams/national_adaptation_plans/items/6057.php)

African nations have so far submitted the First National Communication, and some have also submitted their Second National Communication. All of these documents are available on the UNFCCC website.¹¹⁰

Under **Article 6** of the UNFCCC, parties agreed to promote actions to develop and implement “educational and public awareness programmes on climate change and its effects”. They also agreed to promote “public access to information about climate change and its effects.” Action on Article 6 has been slow, however, and in 2012, the nearly 200 nations that are parties to the UNFCCC agreed to implement something called the “Doha Work Programme on Article 6”. Under this eight-year programme, nations are meant to step up to their obligations under Article 6.¹¹¹ Training is among the activities that fall under Article 6, and three African countries – Benin, Malawi and Uganda – are among the first to benefit from a UN programme that provides assistance with these activities. Each has worked to develop a national strategy for strengthening the skills and knowledge of people who work on climate change.¹¹²

110 See UNFCCC. Non-Annex I national communications (https://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php)

111 See UNFCCC. Doha work programme on Article 6 of the Convention. (<http://unfccc.int/resource/docs/2012/cop18/eng/08a02.pdf#page=17>).

112 See UNCC:Learn. Country Pilot Projects to Strengthen Human Resources and Skills to Address Climate Change (<http://www.uncclearn.org/country-projects>)

Intergovernmental action on climate change

The African Union, the African Ministerial Council on the Environment and Africa's regional bodies all have activities related to climate change.¹¹³

In 2007 African heads of state adopted the African Union's Declaration on Climate Change and Development in Africa.¹¹⁴ It called for member states to ratify the Kyoto Protocol; participate in the UNFCCC; build capacity and invest in data collection and early-warning systems; integrate adaptation strategies into country policies; raise awareness; strengthen cooperation between national meteorological offices, hydrological centres and regional economic communities (RECs); strengthen research, especially in renewables, forestry and agriculture to increase resilience; transfer technologies; put pressure on developed countries on the 'polluter pays' principle to seek deeper greenhouse gas emission cuts. It tasked the AU Commission to follow up with the African Ministerial Conference on the Environment (AMCEN), the United Nations Economic Commission for Africa (UNECA) and the African Development Bank (ADB).

The East African Community's climate change policy was developed following a regional heads of state directive in 2009. The Economic Community of West African States (ECOWAS) policy for disaster risk reduction was adopted at a summit in 2007. In 2013, ECOWAS became the first of Africa's five Regional Economic Communities to develop a strategic programme to address vulnerability to climate change.¹¹⁵ SADC has a Climate Change Cross-sectoral Working Group, and launched its Adaptation Strategy on Water in 2011. COMESA has a Climate Initiative and a Carbon Fund.

A number of decisions and actions have been taken since 2007 through the AU (including heads of state) and the AMCEN to establish joint positions in international negotiations and to set up institutions, including the Climate for Development in Africa programme (Climdev-Africa¹¹⁶) to improve information and the African Climate Policy Centre to support knowledge and capacity.

113 See B. Dewar, 2012, *Climate Change and Africa: Turning up the heat*. Chatham House Africa Programme Paper. London (http://www.chathamhouse.org/sites/default/files/public/Research/Africa/1112pp_dewar.pdf).

114 African Union, 2007, *Declaration on Climate Change and Development in Africa*. Eighth Ordinary Session, 29–30 January 2007 (<http://www.sirtewaterandenergy.org/docs/DeclarationClimateChange-AddisAbaba.pdf>).

115 See ECOWAS, 2013, Sweden supports ECOWAS programme on climate adaptability. Press release (<http://news.ecowas.int/presseshow.php?nb=098&lang=en&annee=2013>).

116 See <http://www.climdev-africa.org/>

African leadership on climate change

African nations have responded to climate change with varying degrees of pace and ambition. Some developed national climate change strategies while others have plans that relate to specific sectors such as agriculture or water. The following examples draw from a 2012 report from the Chatham House Africa Programme, which has more detailed information on African leadership – national and subnational, and from governments, business and civil society.¹¹⁷

It says: "Heads of state and finance, environment and planning ministers can lead by example, mainstreaming climate change considerations into continental, national and sub-national decision making, while producing and implementing programmes for inclusive climate-resilient green growth... African leadership, 'ownership' at all levels and genuine partnership are needed if initiatives are to be truly effective and sustainable."

The Democratic Republic of Congo's national development strategy highlights the importance of forests, their conservation, management and funding by REDD+.

Ethiopia launched a Climate-Resilient Green Economy strategy in 2011. It aims to keep greenhouse gas emissions in 2030 to current levels. Under the plan Ethiopia will improve crops and livestock practices; protect and re-establish forests; expand renewable energy and adopt modern, energy efficient technologies in transport, construction and industry.

Gabon unveiled its Green Gabon plan in 2011. It aims to consider climate change in all sectors of the economy, and noted that that new protected areas and reduced deforestation/degradation had avoided 450 million tonnes of carbon dioxide emissions in a decade. Under the plan Gabon commits to generate 80 per cent of energy from renewable sources (mainly hydro), and reduce gas flaring by 60 per cent by 2015.

Kenya developed its National Climate Change Action Plan 2013-2017 after 20 months of consultation. The 258-page document details Kenya's options for adapting to and mitigating climate change, and for adopting a low-carbon development pathway.¹¹⁸ It identifies the institutions, finance and human capacity that the country needs to do this, and outlines how the country can implement and monitor the work. Developing renewable energy with private-sector support is a national priority, including feed-in tariff policy, focus on geothermal (e.g. potential Menengai 400MW plant), solar and wind (e.g. project near Lake Turkana to produce 300MW).

Mozambique published its green growth roadmap in 2012.

Nigeria has produced policy frameworks such as a Climate Change Commission Bill, adaptation plans and a REDD+ programme.

117 See B. Dewar, 2012, *Climate Change and Africa: Turning up the heat*. Chatham House Africa Programme Paper. London (http://www.chathamhouse.org/sites/default/files/public/Research/Africa/1112pp_dewar.pdf).

118 See Government of Kenya, 2013, National Climate Change Action Plan - Executive Reports (http://www.kccap.info/index.php?option=com_content&view=article&id=31)

Rwanda launched a Green Growth and Climate Resilience strategy in 2011. This includes geo-thermal power generation, soil fertility management, and better design of cities for pedestrians and cyclists, irrigation infrastructure and roads.

South Africa has a National Climate Change Response strategy with both mitigation and adaptation measures designed to enhance social, economic and environmental resilience, and emergency response capacity. It has pledged to reduce its greenhouse gas emissions by 34 per cent by 2020 and 42 per cent by 2025).

Part Five: Reporting on climate change

Seven quick tips for finding stories to report

- 1. Follow the money.** Climate change is a story about hundreds of billions of dollars. Where is that money for adaptation and mitigation. Who controls it? Who spends it? Who makes sure it does what it is meant to do? Who funds the NGOs and the politicians? Which companies stand to profit from action to address climate change? Which stand to lose? One area for media attention is whether rich countries keep their promises to fund climate action in developing nations, and whether the money really is 'new and additional and not from existing aid budgets. There will also be a big debate about how much climate finance should come from public funds and how much from the private sector (which would be unlikely to show interest in funding small-scale adaptation projects that are needed because they offer little chance of a return on any investment). Follow the money and you will find all the elements of a good story.
- 2. Localise the global.** Every day scientists publish new research, policymakers make new announcements, environmental activists issue new demands and strange weather patterns occur. Even if these things happen far away, smart journalists can work out ways of relating these stories to their own local circumstances and audiences. Nongovernmental organisations, universities and scientific journals around the world all produce press releases about climate change, so contact press officers and join their mailing lists to get story ideas and to stay updated with what is happening worldwide.
- 3. Wear climate change glasses and report from new angles.** For every new policy, new invention, new anything, look through your climate-change lenses and ask two questions. "How could X affect climate change?" and "How could climate change affect X?" You will find many new angles for your reporting. **These angles include health, business, technology, food, culture, sport, tourism, religion, politics – in fact, almost everything.**
- 4. Follow the pack.** Keep on top of the climate-change story by reading the work of other journalists who are covering it well (you will find some great international stories at IPS, Reuters AlertNet, The Guardian, New York Times and the BBC but there are also many good reporters covering climate change for national media around the world). Use social media such as Facebook or Twitter to find out what people are saying about climate change and to share your own stories. The Climate News Network offers stories that journalists can adapt for their own use. (<http://www.climate-news-network.net/>).
- 5. Join mailing lists.** The single most important mailing list for climate change journalists is Climate-L (<http://www.iisd.ca/email/subscribe.htm>), through which thousands of climate specialists share their latest reports and information about events. For information on the UN climate-change negotiations journalists can subscribe to the Earth Negotiations Bulletin (http://www.iisd.ca/process/climate_atm.htm).
- 6. Read journals.** The most important and significant research appears in journals such as Nature Climate Change, Geophysical Research Letters, Nature, Science, PNAS, Climatic Change. You can keep track of new research by subscribing to the journal's mailing list – through the free EurekAlert and AlphaGalileo press release services. Journal papers tend to be available only to paying subscribers but journalists can get copies by searching on Google Scholar (<http://scholar.google.com>) for a PDF file or by visiting the journal's website for a given paper. The website will often display the email address of the lead author, who will usually be willing to send journalists a copy of the paper and answer questions. Another way to build up a good contact book of experts is to search the Internet for recent scientific papers on a particular topic (Google Scholar is a good tool as it reveals how many times a paper has been cited by later studies, indicating how important the research is).

- 7. Get connected.** A journalist can never have too many sources. The good news with climate change is that this is something that affects everyone. Journalists can build large contact lists of sources from a broad variety of different sectors, both within and outside of their own countries. These include: policymakers, intergovernmental organisations, UN agencies, civil society organisations and research centres. Some of the best sources will not be from organisations but from the general public – such as farmers and fisherfolk, pastoralists and small business owners. Few people know more about the changing climate than those whose livelihoods it most closely affects.

Climate change on the radio

Radio journalists are more able than most to interact directly with their audiences and bring audience-contributions into their stories. For a subject like climate change, this is valuable for two reasons.

- First, radio journalists can provide opportunities for their listeners to ask about climate change, either through phone-in shows or via SMS. A climate expert in the studio can then answer these questions for all to hear. The role of the journalist here will be to ensure that the expert's answers are not too technical. In fact, the journalist could become enough of an expert to respond to most listeners' questions.
- Second, many radio listeners will themselves have important knowledge about climate change, even if they don't themselves connect their experiences to the global atmosphere. Farmers especially can share information about the changes they have experienced – to growing seasons or pest outbreaks – and about the ways they are dealing with the changes.

Radio stations that broadcast this kind of coverage include Moshi FM in Tanzania, which broadcasts two hour-long programmes each week to around 7,000 villagers in Same district.¹¹⁹ With the help of local agricultural extension officers, the programme advises its audience on suitable planting times, gives them up-to-date weather information and tips on how to increase their crop yields in the face of challenging weather.

Cameroon Radio Television has broadcast a 12-part radio programme about climate change, forests and livelihoods in the Congo Basin, which community radio stations have rebroadcast to their own audiences. The series – called "*Au rythme des saisons*" – educates listeners about climate change, their vulnerabilities and aspects of mitigation and adaptation in language that is simple to understand.¹²⁰



Credit: Internews/Kate Holt

119 See K. Makoye, 2013, Radio show helps Tanzanian farmers fight climate change. (<http://www.trust.org/item/20130822085851-3xcv4/>).

120 See B. Akinwande, 2013, Could radio help mitigate climate change in the Congo Basin? (<http://www.trust.org/item/20130521135629-fq8ht/>).

Twelve quick tips for better stories

1. **Know your audience.** When you sit down to write a story there is only one person that matters: not you, not your editor and not the person you just interviewed. It is the reader, the listener or the viewer – someone who are unlikely to ever meet. Be familiar with your audience’s level of knowledge about climate change, and about the things they care most about. **If in doubt, assume your audience knows nothing** but never make the mistake of assuming they are stupid. The classic error in journalism is to over-estimate the audience’s knowledge and under-estimate their intelligence. Before you finish your story, **remember your audience.** Read it through. Put yourself in the shoes of a typical member of your audience and imagine what questions they might ask about your story. Then answer those questions in your story before you sign off on it.
2. **Team up.** To tell the story of climate change well you need to understand the science, the politics, the economics and more. But nobody can excel in all of these aspects. Even superheroes achieve more as a team, so team up with other journalists. Journalist Eric Pooley has urged media outlets to create climate policy teams that include environmental science reporters, political reporters and business and energy reporters.¹²¹ This mix, working together, would be able to combine their strengths to report more effectively on these three angles, which are deeply connected but usually reported on in isolation.
3. **Drop the jargon.** You need to understand what CDM, REDD and UNFCCC mean but your reader or listener or viewer almost certainly does not. If your interviewees use jargon, be ready to ask them to simplify their language. If your interviewee speaks in complicated terms, remind them that while they have been working on climate change for years, you have been researching your particular story for just a few days or even hours. Remind them that your job is to ensure your audience understands their words. Most experts would prefer to give you a simpler message in their own words than have you simplify things for them. Never be embarrassed to say “I don’t understand. Can you explain it again?”
4. **Be visual** Many climate and environment stories are complex, but they are often also photogenic, or can be illustrated with engaging human stories. Use all the resources you have to bring the story to life – headlines, photos, graphs, maps, sidebars.
5. **Get a second opinion — and a third.** For every PhD there is an equal and opposite PhD. For every politician there is a paymaster. Your interviewees can be wrong; they can be biased. They can have vested interests. Ask yourself why they are saying what they say and whether they stand to gain from you reporting their words. Seek the opinion of other experts from other institutions. As a reporter, you have a double responsibility: both to the truth as politicians and professors may see it, and to the truth as you perceive it.
6. **Quote varied voices.** Climate change affects everyone and everyone can respond to it in a different way. **Think about both gender and generation.** Climate change will affect men and women in different ways. Young people and old people are both more vulnerable than healthy middle-aged people. They also have different perspectives. Very old people have long memories and can describe decades of change. Young people will inherit the problems of climate change and so may have powerful perspectives. By speaking to many different kinds of people about climate change you will get a richer understanding of it, more story ideas and new angles that you can use to tell the story.

121 E. Pooley, 2009, *How much would you pay to save the planet? The American press and the economics of climate change*. Joan Shorenstein Center on the Press, Politics and Public Policy Discussion Paper Series #D-49, January 2009. (http://www.hks.harvard.edu/presspol/publications/papers/discussion_papers/d49_pooley.pdf).

- 7. Speeches are often boring. Get reactions.** It is important for journalists to interview ordinary citizens and create a platform for the voices of those most vulnerable to climate change. The poorest communities are most at risk yet their views generally go unreported. Quoting members of at-risk communities is a great way to add human characters to complex scientific topics but remember that it is important to check their facts as well by reviewing research reports and data about your topic.
- 8. Humanise, Humanise, Humanise.** More than anything else, people care about their health, their wealth and the future of their children. Climate change is relevant to all three of these things, so try to think in those terms when you are working out how to tell your story, both to your editor and your audience. And **make the abstract real**. Putting a price tag on action or inaction will help, especially if you do it in terms people readily understand (like the price of bread or petrol).
- 9. Don't be seduced by press releases... do justice to them.** Too often journalists will copy-and-paste press releases and just add their name. In doing so, they do a disservice to their readers. A press release is not a story, but information that contains the seeds of story that a journalist can develop. While international press releases may be relevant, they will never have been written with any journalist's specific audience in mind. Localise them, get new perspectives and make them relevant to your audience.
- 10. Tell success stories.** Climate change has often brought out the best in human imagination and ingenuity. Around the world, individuals are proving that through innovation, cooperation, and mobilization, solutions to climate change not only exist, but also provide new means of earning livelihoods. The value in highlighting these cases doesn't lie simply in leaving readers smiling but also in demonstrating what is possible.
- 11. Get connected.** Share knowledge and learn from colleagues by joining international networks of journalists, like the Earth Journalism Network, the African Network of Environmental Journalists or one of the many national associations of environment or science journalists (see the list in Part Six of this book).
- 12. Remember that climate change itself does not need to be the story** — it is the context in which so many other stories will unfold. You don't even need to mention the climate to tell a good climate change story. You will probably have more success with editors – and attract more readers – if you keep climate change out of your headlines and opening paragraphs. After all, typical "climate change" stories may repel an important and sizeable audience that has been either turned off by doom and gloom, or has a political reaction against the climate-change narrative.

Reporting climate change in local languages

Journalists whose audiences do not understand English have an additional challenge in reporting on climate change, as English is the dominant language most of the science and international policy debates. The two tools journalists can use to overcome this language deficit are localisation and translation.

The following words and phrase types can typically be localised rather than translated literally:

- **Idioms, metaphors and cultural references** – Many phrases familiar to an English speaker will make no sense if translated literally into another language. These enable journalists to add local perspectives to stories that will feel more natural to audiences.
- **Place names** – Many locations have different names or administrative jurisdictions depending on the languages. You can reference an atlas or an encyclopaedia to ensure accuracy.
- **Names of organizations** (and their acronyms).

Bothina Osama, SciDev.Net's regional coordinator for the Middle East and North Africa has these tips for translation.¹²²

- You can improve your translations by using two resources: dictionaries of scientific terms and trusted scientists who speak both English and your local language.
- Don't depend on just one dictionary of scientific terms. They are not always great quality so look for consensus by checking your translation in at least two dictionaries.

¹²² See B. Osama, 2012, How to report science in local languages. SciDev.Net (<http://www.scidev.net/global/communication/practical-guide/how-to-report-science-in-local-languages-1.html>)

- If these are unavailable, or new terms appear too often, then compile your own.
 - It may be a good idea to check translations on the Internet, but don't rely on one place or translation — seek consensus. Over time you will recognise the best sources.
 - When using a term that will be new to your readers, include the English beside your translation so that interested readers can look it up.
 - Some terms defy translation. If this happens, define the word once in your language then continue using the English term — you don't want your readers distracted from the point of the story by lots of references to its definition.
 - Illustrations and videos can help explain difficult terms.
-



Radio Sila journalist Moubarak Issakha, interviews a community leader about a programme he is organizing to care for community green spaces in Djabal refugee camp near Goz Beida, Chad. Credit: Internews

Reporting on specific aspects of climate change

Reporting on Adaptation

Journalists can find many stories if they track progress and report on the effectiveness of their governments' adaptation plans. To report on adaptation in action, journalists may need to travel to rural areas to find stories about what climatic threats people face and how they are adapting to them. When information is lacking, journalists can look to other countries that face similar climate impacts to see if there are adaptation activities there that are relevant to their local audiences.

Questions to ask

- Is the adaptation project really helping people to adapt to climate change or is it just an example of 'good development'?
- How will the project monitor and measure success?
- How sustainable is the project? Where does the funding come from and what happens when it runs out?
- When adaptation projects are funded by donor agencies, how much of the money actually reaches the people who are adapting to change? How accountable is the project to the community?
- Is this a one-off project or something that can be scaled-up and replicated elsewhere? What would it take for that to happen?
- What are the alternative ways people could adapt to the same climatic threat?
- What projects are in your government's National Adaptation Programme of Action or its National Adaptation Plan? How much progress have they made?
- What happens if adaptation fails?

Sources of information

The **Intergovernmental Panel on Climate Change's** Working Group II (<http://www.ipcc-wg2.org/>) covers impacts, vulnerability and adaptation.

The **UNFCCC** website has a database of local coping strategies, which journalists can search by hazard (e.g. drought) and impact (<http://maindb.unfccc.int/public/adaptation/>). It also has details of the National Adaptation Programmes of Action in each of the Least Developed Countries, as well as the newer National Adaptation Plans that all countries are encouraged to develop.

The **UNDP Adaptation Learning Mechanism** includes country profiles for each African nation (<http://www.adaptationlearning.net/>).

The **Africa Adaptation Knowledge Network** shares knowledge between researchers, civil society, policymakers, etc., (<http://www.aaknet.org/>).

The **Eldis dossier on adaptation** includes detailed information organized by theme and region, as well as a comprehensive listing of organizations that work on adaptation and are good sources for journalists (<http://www.linkingclimateadaptation.org/>)

The **Community Based Adaptation Exchange**, which is an online network with hundreds of members who are sharing information on adaptation (<http://community.eldis.org/cbax/>)

The **WeAdapt** website (www.weadapt.org) also includes contact details of experts in this field and has a Google Earth layer with information on adaptation around the world (<http://www.weadapt.org/placemarks/#/>).

Reporting on REDD+

Reducing emissions from deforestation, forest degradation, and enhancing forest carbon stocks in developing countries (REDD+) seems like an obvious way to tackle climate change. But REDD+ is controversial and fraught with technical challenges. Journalists who cover REDD+ need to understand these sides of the story, as well as the latest on what parties to the UN Framework Convention on Climate Change have agreed about how REDD+ should work.

Questions to ask

- How reliable are the statistics on forest cover, deforestation rate, etc.?
- What is in the text of the REDD+ project contracts?
- How will the REDD+ project be funded, and for how long?
- How will it be monitored, reported and verified?
- What do local communities know and think about the project?
- How much carbon does the project prevent from entering the atmosphere? What does this equate to in terms normal people understand?
- Who manages the money? Who gets the money? Will it reach local forest dependent communities? Or will it go to logging companies?
- Who owns the forest? Is it the state or do local people have ownership or customary rights to use the forest?
- What safeguards are in place to ensure that a REDD+ project in one place won't lead to more deforestation elsewhere?
- What has your country done to prepare for future REDD+ projects (known as REDD Readiness)? Does it have a REDD+ plan?
- Who are the stakeholders? Are you familiar with all of the competing viewpoints of REDD+ (government, NGO, community, private sector, etc.)? Does your reporting reflect majority views or the views of the powerful?
- Which stakeholders get to decide how REDD+ is implemented?

Sources of information

UN-REDD is the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. <http://www.un-redd.org/>

The REDD Desk (<http://www.thredddesk.org/>) is an online collaborative platform for sharing information about all aspects of REDD. It has a country database with information about several African countries (<http://www.thredddesk.org/countries>).

REDD Monitor takes a critical view of REDD and its potential problems. It is a good source of news and story ideas (<http://www.redd-monitor.org/>).

The **Global Canopy Programme** (<http://www.globalcanopy.org/>) is an international NGO that works largely on REDD+. Its Little REDD+ Book summarizes more than 30 proposals that have been made by different countries, nongovernmental groups and others (http://www.globalcanopy.org/sites/default/files/lrb_en_0.pdf).

UN Framework Convention on Climate Change: This site gathers information about the status of REDD+ in the UN climate change negotiations, and what individual countries have proposed (<https://unfccc.int/methods/redd/items/7377.php>).

The International Center for Forestry Research (CIFOR) is a leading source of research on REDD+. It has produced a global map of REDD+ projects (<http://www.forestsclimatechange.org/redd-map/>).

The Ecosystems Climate Alliance (<http://www.ecosystemsclimate.org/>) is a network of nongovernmental organisations that campaign for stronger environmental and social safeguards in REDD+ design and implementation.

Reporting REDD: A guide for journalists produced by the Climate Change Media Partnership (http://www.unep.org/forests/Portals/142/docs/Reporting_REDD-Media_Pack.pdf)

The World Bank Forest Carbon Partnership Facility helps countries prepare for REDD+, explores ways to provide payments and tests ways REDD+ can improve livelihoods and biodiversity conservation (<http://www.forestcarbonpartnership.org/fcp/>).

The REDD+ Partnership (<http://reddpluspartnership.org/>) is a platform for countries to coordinate and scale-up their REDD+ activities. In time it will be replaced by or included in the official REDD+ mechanism that parties to the UN Framework Convention on Climate Change are still to agree.



A forest user cycles through from Kisangani to village of Masako, Democratic Republic of Congo. Credit: CIFOR/Ollivier Girard

Reporting on climate change and health

While climate change can have diverse direct and indirect effects on human health, there are also many false assumptions about these links. Journalists need to understand what researchers are sure about and where they have doubts. They also need to be skilled at explaining risk and uncertainty, and placing the links between climate change and health into a wider context of other health priorities.

Questions to ask

- What does climate change mean for existing health threats? What new health threats could climate change pose?
- How certain are scientists about these threats? What other factors are at play?
- What aspects of the climate-health link are scientists uncertain about?
- Is there scientific consensus or is this just a single study? What does the new study add?
- How much of a risk is there? And how does it compare to other risks?
- How reliable is the baseline data (about incidence of malaria, and about climatic conditions, for instance)?
- What would hospitals and government departments need to do to be prepared for a climatic disaster or new disease outbreak?
- What are the co-benefits of acting to limit the threats climate change poses to health?
- What does your country's National Adaptation Programme of Action, or National Adaptation Plan, say about health?
- What has your country done so far to adapt to the health impacts of climate change?
- Is your country implementing the African Plan of Action for Public Health Adaptation to Climate Change (see below)?

Sources of information

African Plan of Action for Public Health Adaptation to Climate Change (2012-2016) <http://www.afdb.org/en/cop/programme/the-african-plan-of-action-for-public-health-adaptation-to-climate-change-2012-2016/>

Medical journal *The Lancet* has published a special collection of research papers, commentaries and audio-visual material on climate change and health. <http://www.thelancet.com/series/health-and-climate-change>

World Health Organization <http://www.who.int/topics/climate/en/>

Reducing Vulnerability to Climate Change in Sub-Saharan Africa: The Need for Better Evidence. This paper describes the gaps in knowledge, skills and institutions that affect Africa's ability to deal with the health effects of climate change. <http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.1001374>

Atlas of Climate Change and Health. This publication by the WHO is free to download and includes major sections on infectious diseases, emergencies and new health threats. <http://www.who.int/globalchange/publications/atlas/report/en/index.html>

UNECA Working Paper: Climate change and Health across Africa: Issues and Options <http://www.uneca.org/publications/wp-20-climate-change-and-health-across-africa-issues-and-options>

WHO Bulletin. Slums, climate change and human health in sub-Saharan Africa <http://www.who.int/bulletin/volumes/87/12/09-073445/en/>

Chapter 8 of the **Intergovernmental Panel on Climate Change's** fourth assessment report reviews the scientific knowledge of links between climate change and health. (http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch8.html)

SciDev.Net: The challenges of reporting on climate change and health. <http://www.scidev.net/global/malaria/opinion/the-challenge-of-reporting-on-climate-change-and-h.html>

Earth Journalism Toolkit: Communicating Risk. <http://earthjournalism.net/toolkit/?p=237>



A traditional healer in Burkina Faso collecting fruit which will be used to treat malaria. Credit: CIFOR/Olivier Girard.

Reporting on the international climate change negotiations

The UN negotiations on climate change provide plenty of reporting opportunities for journalists, even if they are not there in person. The outcomes of talks define what countries agree to do in order to address climate change – on adaptation, mitigation, finance and technology – and in doing so create storylines that will last for years.

Questions to ask

- How many people are in your country's delegation to the UNFCCC talks? What are their day jobs?
- What are your national negotiators doing ahead of each negotiating session? What are their demands and what do other negotiators think about them?
- Through what process does your country decide its negotiating position, and how does it contribute to the position adopted by larger blocks of nations, such as the Africa Group?
- What is your country doing to implement the decisions that parties to the UNFCCC have already agreed?
- How much money has your country received from each of the UNFCCC funds (Adaptation Fund, Least Developed Countries Fund, Special Climate Change Fund, Green Climate Fund)? Does it have pending applications for funding?

Sources of information:

The **UNFCCC secretariat's** website (www.unfccc.int) is full of important information for journalists – from the text of the convention and the Kyoto Protocol to details of the decisions that parties to the UNFCCC make each year. The site also includes each country's national reports and detailed information on emission targets, pledges of action on mitigation, adaptation and finance.

The UNFCCC secretariat also broadcasts some negotiating sessions and press conferences live on its website, and press releases (<http://unfccc.int/press/items/2794.php>), factsheets and contact details of experts in each country that is party to the convention (<http://maindb.unfccc.int/public/roe/>).

IISD's **Earth Negotiations Bulletin** (http://www.iisd.ca/process/climate_atm.htm) provides daily reports during each Conference of Parties to the UNFCCC and each Meeting of Parties to the Kyoto Protocol. Journalists can subscribe to this good source of neutral information on each negotiating session.

IISD also manages the **Climate-L** (<http://www.iisd.ca/email/climate-L.htm>) email-based mailing list for news and announcements about climate policy, which is another good source of information about the negotiations.

For nongovernmental perspective, sources include the **Climate Action Network** (<http://www.climateactionnetwork.org>), a global alliance of more than 450 organisations. It publishes a daily newsletter called Eco (<http://www.climateactionnetwork.org/eco-newsletters>) during each UNFCCC meeting.

The **Third World Network** (<http://www.twinside.org.sg/climate.htm>) produces briefing papers and daily news updates during UNFCCC sessions.

Reporting on scientific research on climate change

Covering climate science is not easy. But journalists who can report accurately on the science in ways their audiences can understand will find they have many more opportunities to tell stories. Rather than just reporting what the scientists have found, the key challenges for journalists are to understand the real-life implications of new research for media audiences and to explain to these audiences how the new information is relevant to them.

Finding research to report

The first step for journalists is to know when scientists publish their studies. To stay in touch with the latest research journalists can subscribe to press releases from academic journals and follow what other journalists around the world are writing about climate change. Scientists usually publish their research in journals that are not free to access, but scientists will often be happy to email journalists copies of their new papers.

Websites to search for reports on climate science include the Intergovernmental Panel on Climate Change (www.ipcc.ch/), the Public Library of Science (www.plos.org), Google Scholar (www.scholar.google.com), the Directory of Open Access Journals (www.doaj.org), and numerous think tanks a from around the world.

When reporting on a new study, journalists should read and understand the findings of several other relevant studies. These can provide important context: how do these studies compare to one another? Do their findings corroborate one another? Do the new results draw previous findings into question? Interpreting complicated statistics is not easy; even experts can draw the wrong conclusions from their peers' research. So, know your limitations, and – after careful read-throughs and background research – don't be afraid to reach out to the researchers to gain clarification. Direct quotes can help give the researchers a voice in your article.

Of course, reporting the findings of a study is just one component of a journalist's job: providing a balanced assessment is just as important. Just because a study is peer-reviewed does not mean it is above critical evaluation. Journalists must remember to be as nuanced as possible, and remember that even when scientist – or their press officers – say their research is "revolutionary," very rarely does a study completely contradict a large body of scientific research. To most effectively cast a critical eye on academic studies, journalists should examine the purpose of this study (what does this contribute to the field?), researchers' methodology (what controls and variables did they account for?), and report funding (did a corporation with a vested interest in the findings one way or the other support this research?).

Journalists who report on new science should seek the views of scientists who work in the same field but were not involved in the research. To identify people to interview, journalists can search on Google Scholar to see which researchers are active in a particular field of study. There are other ways for journalists to get ready access to climate scientists, including many IPCC members

Avoiding sensationalism

Just as journalists should take care when interpreting the results of an academic study, they should go to great lengths to avoid sensationalism in their reporting. While it is of course important to draw the appropriate linkages between climate change and extreme weather, it is unwise to attribute any single event to global warming. As key figures who inform public policy and individual behaviour, journalists are responsible for presenting new facts – even dire warnings – in an objective light, and considering all external factors that may be at play. Additionally, as building trust with an audience is crucial to a reporter's success, blowing a claim out of proportion will trigger a reader to (rightfully) approach future articles with scepticism.

Journalists who report on climate change need to explain two scientific concepts — risk and uncertainty — to non-scientific audiences. It's a big challenge, not least because scientists themselves have struggled for years to explain these concepts to journalists. Risk is all about the likelihood of something happening, and the likelihood of that thing being a problem (relative to other problems). Uncertainty is a measure of how sure scientists are about something being real.

Reporting scientific uncertainty

As the Union of Concerned Scientists puts it: "To most of us, uncertainty means not knowing. To scientists, however, uncertainty is *how well* something is known" [italics added].¹²³ While scientists know that research points towards a greater understanding of a phenomenon or event even if there is uncertainty, the very existence that uncertainty can be enough for the public and policymakers to conclude that something is not real. In the case of climate change, that's a dangerous difference.

One challenge is that while scientists use numbers that describe how statistically probable something is, non-scientists use words to explain how certain they are. The Intergovernmental Panel on Climate Change uses a simple chart to convert the numbers into words, so a probability above 99 per cent means "virtually certain", a value above 66 per cent means "likely" and so on.¹²⁴

However, one person's understanding of "likely" is the same as another person's understanding of "virtually certain". Journalists may help their audience understand more clearly if they report both the verbal and numerical terms, and use the full numerical range of certainty. For instance: "Scientists say they think it is likely (66-85%) that the region will experience more frequent flooding if global temperatures rise on average by 2 degrees above pre-industrial levels."

Journalists can also report on the factors that scientists say account for their uncertainty. In the example above, they might say: "We are sure that there will be more rain but we can't predict yet when it will fall, and timing is a big factor in flooding."

Journalists should note that scientists can have various levels of certainty about a given subject. Take rising sea levels. Scientists are sure the seas are rising – they can measure that directly. They are nearly certain about what is causing sea levels to rise. But they are much less certain about how much sea levels will rise in different parts of the world, and when.

Such scientific uncertainty makes it important for journalists to avoid comparing unlike scenarios and aggregating statistics from different studies or regions. Doing so may be tempting, but will not illustrate the entire picture.

123 See Union of Concerned Scientists. Certainty vs. Uncertainty (http://www.ucsusa.org/global_warming/science_and_impacts/science/certainty-vs-uncertainty.html)

124 See IPCC, 2007, Climate Change 2007: Synthesis Report. Intergovernmental Panel of Climate Change, Geneva, Switzerland. (http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf).

Reporting on risk

Risk is the other major scientific concept for journalists to understand and explain. Journalists who report on risks to people or the environment must take care neither to exaggerate nor underplay the scale of any threat. Though deceptively simple, risk is one of the hardest things to communicate accurately, partially because it can be very hard to actually determine what is a real risk, and partially because public perceptions of risk can be very different from those of scientists and other experts.

To report accurately on risk, journalists must be able to understand statistics and be able to explain them in a way that is accurate and clear to their audience. Journalists who fail to do so can create disproportionate fears or unrealistic hopes, lose the trust of their audiences, and can discourage scientists from talking to the media for fear that reporters will distort their findings.

Risk is not the same as danger: it is a measure of the *likelihood* of danger. We know that some things, such as plane crashes, are very deadly but extremely unlikely. So, overall, the risk of flying is low.

When reporting on a risk it is important to state what the risk is relative to. For instance, a study may conclude that climate change would double the risk of major floods in a coastal city. This 100 per cent increase sounds serious, but if the current frequency of floods is low, a doubling is still a relatively small risk. Journalists should also note susceptibility to risk varies greatly by demographic, so they should try to explain what other factors could heighten a risk, such as age, gender, livelihood, or wealth.

Journalists should understand how significant the evidence of risk is, as individual studies often contradict one another. If one study identifies a certain risk, but twenty others on the same subject find no risk, journalists should be wary of reporting the risk until they seek the views of credible independent sources.

The easiest way for a journalist to be sure that they understand a risk is to talk with the source of the information, such as the author of a scientific report. Reporters can also check whether they can effectively communicate the risk by asking colleagues to see if they understand it. To help make sense of risks, it can be useful to compare them to other well-known factors that people are more familiar with. A comparison with the risk of dying in a road traffic accident can help to show the likelihood of a threat, while a comparison with the total number of people who die each year of all causes in a given place can help to show the scale of a threat.

Sources of information

US Department of Energy guide "Reporting on climate change: understanding the science" <http://www.elistore.org/Data/products/d13-11.pdf>

New Scientist magazine's guide to the science of climate change <http://www.newscientist.com/article/dn11462-climate-change-a-guide-for-the-perplexed.html>

The Intergovernmental Panel on Climate Change website has some pages for journalists, which include press releases, information about meetings, and fact sheets. http://www.ipcc.ch/press_information/press_information.htm

SciDev.Net's guide to communicating statistics and risk <http://www.scidev.net/en/science-communication/practical-guides/communicating-statistics-and-risk.html>

Union of Concerned Scientists – Certainty vs. Uncertainty: Understanding scientific terms about climate change http://www.ucsusa.org/global_warming/science_and_impacts/science/certainty-vs-uncertainty.html

Sourcing and using data, photos, maps, and graphics

The volume of freely available data about climate change is steadily increasing as governments and international groups publish more of their information online. For a journalist working to explain the realities of climate change, data is a helpful assistant. It can add both concrete evidence for a specific claim and help explain the global context for a local story. For this reason, this book includes a sampling of climate data focused on carbon emissions, finance, and key sectors at risk for every country in Africa (see Part Six). This data comes from a variety of sources detailed below. But the data in this book is just a good place to start as many governments, academics, and civil society groups have more detailed local information available on topics ranging from weather to land use and more.

World Bank Climate Indicators <http://data.worldbank.org/topic/climate-change>

The World Bank has compiled a database that includes 52 climate change-related indicators for nearly all African countries. There are time sequences available that can help provide insights into regional and country trends. This data is not limited to climate information. Many of the indicators focus on trends in economic development, health, agricultural productivity, and natural hazards. In addition to the data included in this book, the World Bank also hosts long term analysis of historical weather patterns available through the World Bank Climate Change Knowledge Portal.

Climate Funds Update (CFU) <http://www.climatefundsupdate.org/>

The CFU tracks all multilaterally governed funds focused on climate change, many of which have links to the UNFCCC. Bilateral initiatives are also tracked but not complete so it is important to realize that not all climate financing is included in this database. The data is cumulative since 2003 and updated twice a month. Analyses of regional and country funding trends are also available on the site.

Dara Climate Vulnerability Monitor <http://daraint.org/climate-vulnerability-monitor>

This database is structured around two core areas, the impacts of climate change on society and the independent impact of the carbon economy on society (separate from climate change). Within each category are specific indicators like desertification for climate impacts or oil spills for the carbon economy. The goal of the monitor is to analyse the degree to which a community experiences harm as a result of a change in climate. Each indicator is compiled on a country-by-country basis and can be used to identify the specific climate change induced vulnerabilities your country faces.

Intergovernmental Panel on Climate Change (IPCC) Data Distribution Centre <http://www.ipcc-data.org>

The data used to create IPCC's assessment reports is made available through the Data Distribution Centre. This site combines observed climate dataset and climate model data that is used to create predictions about the future results of climate change.

Using data

Journalists can do more than just present data. They can use it as a research tool. It can reveal the trends that can support the conclusions included in articles. Finding outliers—extreme or atypical occurrences—in data can be the start of an investigation. Why is this data different than the norm? Finding that answer can itself be a story. The other major use of data is visualization. Turning data into a map or an infographic can help you narrate a story in a visual way. This approach requires some design skills and planning and it is advisable to review previous examples and tutorials found in this book and elsewhere if you are going to make your own visualizations.

Images that add to the climate change story

Climate change presents unique challenges to reporters seeking to describe it. The climate is the pattern of average weather over a long time, the atmosphere itself is invisible, and a direct impact like an extreme weather event or a food shortage only demonstrates a relationship to climate change. Ask yourself, have you ever seen “climate change?”

Words alone often fail to describe the interconnected web of influences and impacts summarized in a term as big as climate change and images are well suited to help make stories personal and real. By using a range of complementary images including pictures, maps, graphics, and drawings journalists can help strengthen their reports with evidence and explanation.

Many news outlets have photographers available either on staff or on contract. In these situations, close collaboration between writers and photographers is important. Working as a team and discussing the story’s background research, the angles, and the key photo opportunities will help yield good results. If you don’t have the option of working directly with a photographer, there are still ways to include photos in your reporting. You can take the photos yourself, search for images online (Creative Commons images are free while stock photos are not), or request pictures from your audience via social media.

Data driven images like maps and graphics help readers visualize patterns or processes that underlie the narrative of your article. Though they do take time and resources to create, of using maps and graphic is beneficial if they effectively connect abstract ideas to real life. Someone might not care about ocean level rise, but they will if they see a map showing their own house under water. When deciding if you should use a map in your article, ask yourself if location is an important part of your story. If you are dealing with a broad or contentious subject, you can use maps to show local or regional variations in a trend.

Similarly, graphics (also known as infographics) can help present statistical information in a more understandable way or efficiently describe an intricate process. There are many types of infographic some common uses/purposes include: timelines, comparisons, charts, and process diagrams.

Much like photography, some media organizations have staff dedicated to creating maps and graphics to accompany their stories but the vast majority still don’t have the funds or time to make the investment. It is difficult but not impossible for a journalist to incorporate a multitude of visual elements into their reporting and there are many free training resources available to help you get started learning to use these new communications tools.

Resources for Finding Photos:

Free: Flickr, Picasa, Wikimedia Commons **Paid:** iStockPhoto, Getty

Resources for Making Maps:

Google Fusion Tables, MapBox, CartoDB, qGIS, School of Data,

Resources for Making Graphics:

Google Spreadsheets, Tableau Public, Gephi, Many Eyes, D3 (Data Driven Documents)

Part Six: Reference section

Africa's climate and how it might change

The science of climate change in Africa is too complex and fast-evolving to summarise in this guide. To effectively cover climate change, journalists should familiarise themselves with the regional drivers of climatic conditions and the ways that, within regions, topography, vegetation and the presence of large bodies of water can affect local weather.

Five key drivers of climatic conditions in Africa

North Atlantic Oscillation

- This term describes the annual variations of the westerly winds that cross the Atlantic Ocean from the Arctic. In years in which these winds are weaker, cold European winters can send fierce storms across the Mediterranean Sea, where they bring increased rainfall to North Africa.

Inter-Tropical Convergence Zone

- This is the equatorial zone where northeast and southeast winds close to the Earth's surface merge, forming a band of clouds that give rise to tropical monsoons.

El Niño–Southern Oscillation

- For at least nine months roughly every five years, the Pacific Ocean experiences anomalously warm (El Niño) or cold (La Niña) temperatures. During La Niña, colder temperatures in the eastern Pacific cause low-lying winds to intensify, leading to wetter conditions over Southern Africa and drier conditions across equatorial East Africa from December to February.

West-African Monsoon

- Every February, the storm system known as the West-African Monsoon migrates north from the equatorial Atlantic to the coast of Africa, making landfall along the western coast in June. Disrupting the normal dry, easterly winds of the Inter-Tropical Convergence Zone, the monsoon carries wet, southerly clouds across the Sahel during the summer, before moving south again in October.

Indian Ocean Dipole

- This describes the irregular warming and cooling of sea-surface temperatures of the western Indian Ocean. In its warmer phase, higher sea temperatures accelerate evaporation rates, and the resulting moist air carries increased rain to Mozambique and other parts of eastern and southern coastal Africa.

Most of Africa experienced a temperature increase of roughly 0.7°C during the 20th century, and according to the World Meteorological Organization. The Intergovernmental Panel on Climate Change has said with “high confidence that it is virtually certain” that Africa will experience further warming across the majority of its major regions.

To determine how climate change will manifest, scientists use mathematical models to make informed estimations. But with so many variables to consider, a lack of long-term data from much of Africa, and the obvious uncertainty of future human behaviour, much of what they know about the future of climate change is limited to generalisations. Generally speaking, though, two noticeable trends that have emerged in recent decades are projected to continue or even accelerate. First, the Sahel and southern Africa have become drier. Second, rainfall is projected to decline in the early phase of rainy seasons, but intensify in the latter portions. Indeed, since the 1970s, the North Atlantic has seen an increased intensity of its tropical cyclones, directly affecting the coastlines of North and West Africa.

Regional variations in climate

What follows is only an overview. For a more detailed information, journalists can consult the Intergovernmental Panel on Climate Change’s Fifth Assessment Report.

North Africa

- This region has arid and semi-arid climates, as well as tropical coastal areas. Already Africa’s warmest and driest region, it is only predicted to warm even further, a projection the IPCC calls very likely. With this increase in temperature will come a concurrent increase in the risk of heat stroke from May through October. When the North Atlantic Oscillation enters its weaker phase, storm activity across the region intensifies.

West Africa

- The West-African monsoon system normally dominates the climate. Humid equatorial conditions give way to a rainy season from May through September. If climate change maintains its current pace throughout the next century, climate models predict wetter conditions in May (by up to 50 per cent in some areas) and late summer, either side of a mid-summer drought. These extremes could increase the likelihood of flooding. At the same time, experts expect the Sahel to see its hottest temperatures to date, with one model projecting a high risk of heat stroke for 160 days each year.

East Africa

- Together, the migration of the Inter-Tropical Convergence Zone across the equator and the peaks and troughs of the El Niño–Southern Oscillation contribute to semi-annual rainfall cycle in Eastern Africa, marked by two periods of sustained rainfall: the ‘long rains’ from March through May, and the ‘short rains’ that peak between October and December, depending on the year. Climate variability is for the most part determined by Indian Ocean sea surface temperatures: in recent decades, a series of positive Indian Ocean Dipole phases have contributed to warmer ocean temperatures, which in turn have produced moist, easterly winds. As a result, there has been increased rainfall during the shorter rain season in the northern part of the region (the effect on the longer rain season remains unclear.) Farmers in East Africa, could reap the benefits of one of climate change’s silver linings in the years to come. This is because Indian Ocean temperatures are set to continue to rise. This could lengthen growing seasons in the

highlands by increasing short season rainfall – anywhere between 8 and 22% across the region – and decreasing the severity of dry spells.

Central Africa

- Across Central Africa, climates range from tropical-dry to arid. Since the 1960s, the region warmed by 0.29°C per decade in tropical forests. Effects on precipitation vary within the region, with decreased rainfall in the Congo Basin, but a ten percent increase along Guinean coast. Scientists predict wetter June conditions particularly in the eastern part of the region, followed by severe drying in July and August.

Lake Chad: Where climate and mismanagement collide

Once 250,000 square kilometres in area, Lake Chad has shrunk to just one-tenth of its original volume, serving as one of the world's most striking images of the physical consequences of climatic change. Experts blame much of the disappearance of the lake – upon which 30 million people in Niger, Chad, Cameroon, and Nigeria depend for their livelihoods – on both human actions such as inefficient damming and irrigation, and shifting climate patterns. But in 2007, UNEP and the Lake Chad Basin Commission concluded climate change is responsible for at least half of the shrinkage.

Southern Africa

- With the exception of the extreme south-west of the region, which receives rainfall during the winter, southern Africa experiences a single, prolonged rainy season between the summer months of November and April. In the past 50 years, the total annual rainfall has not increased or decreased in a perceptible pattern, but the increasing variability of rainfall between years has put a stress on the region. Altered cyclone patterns in the southern Indian Ocean will carry more moisture to East Africa, and the majority of southern Africa (with localised exceptions throughout the region) is likely to become drier in the coming century, with rains decreasing by at roughly 10 per cent. In parts of Botswana and Namibia, average temperatures could rise by as much as 5°C.

Country-by-country: Finance, emissions and vulnerability

This table provides country-by-country data on greenhouse gas emissions, climate finance and vulnerability for each nation. The finance data is from climate funds update (www.climatefundsupdate.org), the emissions data is from the World Bank, and the vulnerability assessments come from Dara, which also has details of which of 22 different aspects of vulnerability are most relevant to each country (see <http://daraint.org/climate-vulnerability-monitor>).

	Climate finance (US\$ millions) in 2012	Total CO2 emissions (ktCO²) in 2009	Per capita CO² emissions (metric tons) in 2009	Climate vulnerability 2010	Climate vulnerability 2030
Algeria	18.6	121311.7	3.3	Moderate	Moderate
Angola	13.1	26655.4	1.4	Severe	Acute
Benin	23.9	4855.1	0.5	Severe	Acute
Botswana	9.7	4429.7	2.3	Moderate	Moderate
Burkina Faso	54.9	1668.5	0.1	Severe	Acute
Burundi	21.1	190.7	0.0	Severe	Acute
Cameroon	39.6	6673.9	0.3	Severe	Acute
Cape Verde	7.5	315.4	0.6	High	Severe
Central African Republic	23.4	234.7	0.1	Acute	Acute
Chad	2.0	414.4	0.0	Severe	Acute
Comoros	12.6	124.7	0.2	Acute	Acute
Congo, Dem. Rep.	107.7	2695.2	0.0	Severe	Acute
Congo, Rep.	21.8	1943.5	0.5	High	Severe
Cote d'Ivoire	18.1	6596.9	0.4	Severe	Acute
Djibouti	28.9	531.7	0.6	High	Severe
Egypt	541.9	216136.6	2.8	Low	Low
Equatorial Guinea	0.9	4814.8	7.1	High	Severe
Eritrea	6.7	513.4	0.1	High	Severe
Ethiopia	87.4	7887.7	0.1	High	Severe
Gabon	19.9	1624.5	1.1	Severe	Acute
Gambia, The	29.2	436.4	0.3	Acute	Acute
Ghana	46.3	7444.0	0.3	High	Acute
Guinea	12.3	1228.4	0.1	Acute	Acute
Guinea-Bissau	4.2	293.4	0.2	Acute	Acute
Kenya	453.4	12350.5	0.3	Moderate	Moderate
Lesotho	18.3	N/A	N/A	Acute	Acute
Liberia	19.0	524.4	0.1	Low	Moderate
Libya	N/A	62874.4	10.5	Acute	Acute
Madagascar	12.6	1822.5	0.1	Severe	Acute
Malawi	41.0	1059.8	0.1	Acute	Acute
Mali	33.4	612.4	0.0	Severe	Acute
Mauritania	27.5	48815.1	0.6	Severe	Acute

Morocco	365.4	2599.9	1.6	Moderate	High
Mozambique	88.8	3586.3	0.1	Acute	Acute
Namibia	7.2	1158.8	1.7	Moderate	Severe
Niger	117.3	70234.1	0.1	Severe	Acute
Nigeria	45.4	726.1	0.5	Severe	Acute
Rwanda	49.9	128.3	0.1	High	Severe
Sao Tome and Principe	13.5	4576.4	0.7	Acute	Acute
Senegal	32.3	737.1	0.4	Severe	Acute
Seychelles	6.2	682.1	8.4	Severe	Acute
Sierra Leone	26.4	1415.5	0.3	Acute	Acute
Somalia	8.4	594.1	0.1	Acute	Acute
South Africa	497.3	499016.4	10.1	Moderate	Moderate
Sudan	40.4	14338.0	0.3	High	Acute
Swaziland	3.6	1023.1	0.9	Moderate	High
Tanzania	180.6	6960.0	0.2	High	Acute
Togo	19.6	1485.1	0.2	Severe	Acute
Tunisia	15.7	25155.6	2.4	Low	Moderate
Uganda	33.4	3480.0	0.1	High	Severe
Zambia	23.7	1983.8	0.2	Severe	Acute
Zimbabwe	6.6	8914.5	0.7	High	Severe

Directory of climate change contacts for journalists

This section of the book provides contact details of nongovernmental organisations, research centres and intergovernmental organisations that work on climate change in Africa. This is not an exhaustive list, but should help journalists who need such contacts. The Climate Change Media Partnership's roster of experts also has details of many relevant contacts (<http://climatechangemedia.ning.com>), as does the UNFCCC roster <http://maindb.unfccc.int/public/roe/>

Civil society organisations

Non-governmental organisations that work on climate change tend to focus on raising community awareness of the threats, supporting projects through which people can adapt to climate change, providing early warnings of climatic disasters and relief after they strike, and supporting mitigation activities such as tree-planting and renewable energy projects. Coalitions such as Climate Action Network-Africa and the PanAfrican Climate Justice Alliance have hundreds of member organisations across Africa. Such organisations are not only useful sources of comment on climate change, but can also be sources of stories. As they work closely with communities, they can help journalists to reach people with personal testimony of climate change and its effects.

- Advancing Capacity to Support Climate Change Adaptation <http://accaproject.org/accca/>
- Africa Adapt <http://www.africa-adapt.net/>
- Africa Adaptation Knowledge Network <http://www.aaknet.org/>
- Africa Climate Exchange – Birdlife <http://www.africa-climate-exchange.org/>
- African Center for Research, Development and Climate Change www.freetocharities.org.uk/afredecc
- African Climate Change Research Centre www.africanclimatecentre.org/
- AfriCAN Climate <http://www.africanclimate.net/>
- Association for Environmental Impact Assessment of Nigeria <http://www.aeian.org/>
- Candlelight for Health, Education, and Environment (Somalia) <http://candlelightsomal.org/>
- Carbon Tanzania <http://www.carbontanzania.com/>
- CARE's Climate Change Information Centre <http://www.careclimatechange.org/>
- Citizens for a Better Environment (Zambia) www.cbezambia.org
- Climate Action Network – International <http://www.climateactionnetwork.org/>
- Climate Change and Urban Vulnerability in Africa <http://www.cluva.eu/>

- Climate Change Forum - Ethiopia www.climateethiopia.org
- Eldis Climate Change Resource Guide <http://www.eldis.org/go/topics/resource-guides/climate-change>
- ENDA (Senegal) <http://endatiersmonde.org/instit>
- Excellent Development www.excellentdevelopment.com
- Fair Climate Network Southern Africa <http://www.fairclimateafrica.com/>
- Forum for Environment (Ethiopia) <http://www.ffe-ethiopia.org/>
- Friends of Lake Victoria: <http://www.osienala.org/>
- Indigenous Peoples of Africa Co-ordinating Committee (IPACC) <http://www.ipacc.org.za/>
- Jeunes Volontaires pour l'Environnement Cameroun www.jvecameroun.blogspot.com
- Kenya Climate Justice Women Champions www.kcjwc.org
- Namibia Nature Foundation: <http://www.nnf.org.na/>
- Niger Delta Development Initiative: <http://www.nddi.org/>
- Nigeria Climate Action Network <http://nigeriacan.org/web/>
- Nile Basin Initiative: <http://www.nilebasin.org/newsite/>
- Pan-Africa Climate Justice Alliance www.pacja.org.
- Panos Institute Southern Africa (PSAf) www.panos.org.zm
- Rwanda Environmental NGOs Forum: <http://rengof.org/>
- Self Help Africa <http://www.selfhelpafrica.org>
- SouthSouthNorth www.southsouthnorth.org
- Sudanese Environment Conservation Society: <http://www.secs.org.sd/>
- Tanzania Climate Change Alert and Resilience www.tccar.co.tz
- The Accra Caucus for Forests and Climate Change www.rainforestfoundationuk.org/Accra_Caucus
- The Africa Climate Change Resilience Alliance <http://community.eldis.org/accra/>
- The Red Cross / Red Crescent Climate Centre <http://www.climatecentre.org>

Academics and researchers

Researchers at universities, independent research centres and international organisations with offices in African nations are working to understand many aspects of climate change science and policy. But these organisations are not always very good at communicating about their work. Journalists need to make contact with staff there to find out about the projects they are working on and the results of any completed studies. A growing number of these sources employ press officers to liaise with the media about their forthcoming news, and journalists can usually request to receive their press releases via email.

- Africa Climate Change Fellowship Programme <http://www.accfp.org/>
- Africa Climate Change Resilience Alliance <http://community.eldis.org/accra/>
- African Agricultural Technology Foundation – AATF www.aatf-africa.org
- African Centre for Technology Studies www.acts.or.ke/
- African Centre of Meteorological Applications for Development – ACMAD <http://www.wamis.org/countries/acmad.php>
- African Technology Policy Studies (ATPS) Network www.atpsnet.org
- Agrhyet Regional Centre <http://www.agrhyet.ne/eng/>
- Agricultural Research for Development <http://www.cirad.fr>

- Assessments of Impacts and Adaptations to Climate Change – AIACC <http://www.aiaccproject.org/>
- Association for Strengthening Agricultural Research in Eastern and Central Africa <http://www.asareca.org/>
- Bureau for Food and Agricultural Policy (South Africa) <http://www.bfap.co.za/>
- CCAFS -- The CGIAR Research Program on Climate Change and Food Security www.ccafs.cgiar.org
- Centre for Environmental Economics and Policy in Africa <http://www.ceepa.co.za/>
- Centre for International Earth Science Information Network <http://www.ciesin.columbia.edu>
- Climate & Development Knowledge Network <http://cdkn.org/regions/africa/>
- Climate Change and African Political Stability <http://www.strausscenter.org/ccaps/>
- Climate Exchange Network for Africa
- Climate Systems Analysis Group at the University of Cape Town <http://www.csag.uct.ac.za/>
- Eastern African Root Crops Research Network www.iitaesarc.co.ug
- Energy Research Centre, University of Cape Town <http://www.erc.uct.ac.za/>
- Ethiopian Institute for Biodiversity <http://www.ibc.gov.et>
- Famine Early Warning Systems Network – FEWSNET www.fews.net
- Food, Agriculture and Natural Resources Policy Analysis Network – FANRPAN <http://www.fanrpan.org/>
- Forum for Agricultural Research in Africa <http://www.fara-africa.org/>
- Global Change and Hydrological Centre <http://www.glowa.org/>
- Global Climate Observing System <https://www.wmo.int>
- <http://cenafrica.net/>
- IDRC - Climate Change Adaptation in Africa Programme www.idrc.ca/ccaa/
- IGAD Climate Prediction and Applications Centre <http://www.icpac.net/>
- International Institute for Environment and Development – www.iied.org/climate-change-group
- International Institute for Sustainable Development www.iisd.org
- International Research Institute for Climate and Society <http://portal.iri.columbia.edu/portal/server.pt>
- Kenya Forestry Research Institute www.kefri.org
- Observatory of the Sahara and Sahel <http://www.oss-online.org/>
- South African Environmental Observation Network <http://www.saeon.ac.za/>
- Southern African Science Service Centre for Climate Change and Adaptive Land Management – SASSCAL www.sasscal.org/
- The Ecosystems and Livelihoods Adaptation Network <http://www.elanadapt.net/>
- University of Jos Centre for Environmental Resources and Hazards Research www.unijos.edu.ng/
- Water, Climate and Adaptation Programme for Africa <http://www.gwp.org/en/WACDEP/>
- West African Science Service Centre on Climate Change and Adapted Land Use <https://icg4wascal.icg.kfa-juelich.de/>
- World Agroforestry Centre – ICRAF www.worldagroforestry.org
- World Meteorological Organization www.wmo.int

Government/intergovernmental/UN/donor

Each country has a national focal point for the UN Framework Convention on Climate Change. This is a named individual in a government department whose contact details are listed here: <http://maindb.unfccc.int/public/nfp.pl>. These are, however, not the only important government sources, as climate change increasingly features of the work of multiple ministries. The section of government that tends to take responsibility for climate change is the environment ministry,

but as climate change is relevant to so many other sectors (water, agriculture, tourism, forestry, education, finance) governments are increasingly trying to integrate climate change into all areas of policy. Journalists need to know which civil servants and government departments work on climate change, and what their budgets and plans are. They need to know what governments have committed to do, either domestically or in the international arena.

- Africa Adaptation Programme (UNDP) <http://www.undp-aap.org/>
- African Ministerial Conference on the Environment (AMCEN) <http://www.unep.org/roa/amcen/>
- African Union Commission <http://au.int/en/contact>
- Climate for Development in Africa (ClimDev-Africa) Programme <http://www.climdev-africa.org/>
- Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel <http://www.cilss.bf/>
- Economic Community Of West African States – ECOWAS <http://www.ecowas.int/>
- Food and Agriculture Organisation of the United Nations – FAO www.fao.org/climatechange
- SADC Climate Risk Capacity Building <http://www.sarva.org.za/sadc/index.php>
- The Adaptation Fund <https://www.adaptation-fund.org/>
- UN Commission on Sustainable Development: <http://www.un.org/en/development/>
- UN Inter-Agency Standing Committee Taskforce on Climate Change: <http://www.humanitarianinfo.org/iasc/pageloader.aspx?page=content-subsidi-common-default&sb=76>
- UNDP Adaptation Learning Mechanism <http://www.adaptationlearning.net/>
- UNECA African Climate Policy Centre www.uneca.org/acpc
- World Bank – climate change and Africa <http://tinyurl.com/l53bmmx>
- World Health Organization: Protection of the Human Environment: <http://www.who.int/peh/index.html>
- World Meteorological Organization: http://www.wmo.int/pages/index_en.html

Networks of journalists

International / regional

- African Federation of Science Journalists <http://www.wfsj.org/associations/page.php?id=77>
- African Network of Environmental Journalists <http://www.anej.info>
- Climate Change Media Partnership <http://climatechangemedia.ning.com/>
- Internews Earth Journalism Network <http://earthjournalism.net/user/register>
- Network of Climate Journalists in the Greater Horn of Africa <http://www.necjogha.org/>
- Pan-African Media Alliance on Climate Change <http://pamaccfrica.blogspot.co.uk/>

National networks

- Benin: Association des Journalistes et Communicateurs Scientifiques du Benin <http://www.ajcsb.net/>
- Burkina Faso: Association des Journalistes et Communicateurs scientifiques du Burkina Faso <http://www.wfsj.org/associations/page.php?id=264>
- Cameroon: SciLife - Cameroon's Association of Science Journalists and Communicators <http://www.wfsj.org/associations/page.php?id=84>
- Ethiopia: Ethiopian Environment Journalists Association <https://www.facebook.com/pages/EEJAethiopian-Environment-Journalists-Association/157328710989454>
- Kenya: Kenya Environment and Science Journalists Association <http://www.kensja.net/>

- Kenya: Media for Environment, Science, Health and Agriculture <http://www.wfsj.org/mesha/>
- Malawi: Association of Environmental Journalists in Malawi <http://aejmalawi.wordpress.com/>
- Malawi: Forum For Environmental Communicators <http://fecomalawi.blogspot.co.uk/>
- Niger: Association des Journalistes Scientifiques du Niger <http://www.wfsj.org/associations/page.php?id=265>
- Nigeria: Nigeria Association of Science Journalists <http://www.wfsj.org/associations/page.php?id=87>
- Rwanda: Rwanda Association of Science Journalists <http://www.wfsj.org/rasj/>
- South Africa: South African Science Journalists' Association <http://sasja.org/>
- Tanzania: Journalists Environmental Association of Tanzania <http://www.jettanz.com/>
- Togo: Science Journalists and Communicators of Togo (JCS-Togo) <http://jcstogo.info/>
- Uganda: Uganda Science Journalists' Association <http://www.scienceuganda.ug/>
- Zimbabwe: Zimbabwe Environmental Journalists Association <http://www.zejaworld.org/>

Glossary of climate change terms

Adaptation: Activities undertaken as well as individual and collective behavioural changes aiming to reduce the vulnerability and build the resilience of biological and human systems to the effects of global warming.

Aerosol: An aerosol is a collection of microscopic particles, solid or liquid, suspended in a gas. In the context of air pollution, an aerosol refers to fine particulate matter that is larger than a molecule, but small enough to remain suspended in the atmosphere for at least several hours.

Afforestation: The establishment of a forest through tree planting or seeding on land that has lacked forest cover for a very long time or has never been forested.

Agenda 21: Adopted in 1992 at the United Nations Conference on Environment and Development (UNCED), Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations system, governments, and major groups in every area in which humans impact the environment.

Agroforestry: An ecologically based farming system that, through the integration of trees in farms, increases social, environmental and economic benefits to land users.

Anthropogenic: Man-made, not natural.

Arable land: Land that can be used for growing crops.

Atmosphere: General name for the layer of gases around a material body; the Earth's atmosphere consists, from the ground up, of the troposphere, stratosphere, mesosphere, ionosphere (or thermosphere), exosphere and magnetosphere.

Biodiversity: The variety of life in all its forms, levels and combinations; includes ecosystem diversity, species diversity, and genetic diversity.

Bioenergy: Used in different senses: in its most narrow sense it is a synonym for **Biofuel**, fuel derived from biological sources. In its broader sense it encompasses also **Biomass** (e.g. wood), the biological material used as a biofuel.

Biofuel: The fuel produced by the chemical and/or biological processing of biomass. Biofuel will either be a solid (e.g. charcoal), liquid (e.g. ethanol) or gas (e.g. methane).

Biogas: Landfill gas and sewage gas, also called biomass gas.

Biomass: The materials derived from photosynthesis such as forest, agricultural crops, wood and wood wastes, animal wastes, livestock operation residues, aquatic plants, and municipal and industrial wastes; also, the quantity of organic material present in unit area at a particular time mostly expressed as tons of dry matter per unit area; also organic matter that can be used as fuel.

Biome: A climatic and geographically defined area of ecologically similar communities of plants, animals, and soil organisms, often referred to as ecosystems.

Biosphere: The part of the Earth, including air, land, surface rocks, and water, within which life occurs, and which biotic processes in turn alter or transform.

Carbon credit: A market-driven way of reducing the impact of greenhouse gas emissions; it allows an agent to benefit financially from an emission reduction.

Carbon dioxide equivalent (CO₂e): The unit used to measure the impacts of releasing (or avoiding the release of) different greenhouse gases; it is obtained by multiplying the mass of the greenhouse gas by its global warming potential. For example, this would be 21 for methane and 310 for nitrous oxide.

Carbon dioxide: A gas with the chemical formula CO₂; the most abundant greenhouse gas emitted from fossil fuels.

Carbon footprint: A measure of the carbon emissions that are emitted over the full life cycle of a product, service or lifestyle.

Carbon neutral: Generally refers to activities where net carbon inputs and outputs are the same. For example, assuming a constant amount of vegetation on the planet, in the short term burning wood will add carbon to the atmosphere but this carbon will cycle back into new plant growth.

Carbon sink: Any carbon storage system that causes a net removal of greenhouse gases from the atmosphere.

Carbon source: Opposite of **carbon sink**; a net source of carbon for the atmosphere.

CFC: Chlorofluorocarbon. CFCs are potent greenhouse gases which are not regulated by the Kyoto Protocol since they are covered by the Montreal Protocol.

Chronic: Occurring over a long period of time, several weeks, months or years.

Climate: The composite or generally prevailing weather conditions of a region, as temperature, air pressure, humidity, **precipitation**, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years.

Climate change: The long-term change in the earth's climate, especially due to an increase in the average atmospheric temperature, considered to be caused mainly by the emissions of greenhouse gases from human activities.

Concentration: The amount of one substance dissolved or contained in a given amount of another substance or medium. For example, sea water has a higher concentration of salt than fresh water does.

Cyclone: Intense low pressure weather systems; mid-latitude cyclones are atmospheric circulations that rotate clockwise in the Southern Hemisphere and anti-clockwise in the Northern Hemisphere and are generally associated with stronger winds, unsettled conditions, cloudiness and rainfall. Tropical cyclones (which are called hurricanes in the Northern Hemisphere) cause storm surges in coastal areas.

Deforestation: the conversion of forested areas to non-forest land for agriculture, urban use, development, or wasteland.

Desert: An area that receives an average annual precipitation of less than 250 mm, or an area in which more water is lost than falls as precipitation.

Desertification: The degradation of land in arid, semi-arid and dry sub-humid areas resulting from various climatic variations, but primarily from human activities.

Drought: An acute water shortage relative to availability, supply and demand in a particular region. An extended period of months or years when a region notes a deficiency in its water supply

Ecosystem: Whole complex of relationships between species among themselves and with the inert medium in which they operate. The ecosystem includes the biota and habitat.

Ecological Footprint: A measure of the area of biologically productive land and water needed to produce the resources and absorb the wastes of a given population (e.g. a country, a region or the whole world).

Ecology: The scientific study of living organisms and their relationships to one another and their environment; the scientific study of the processes regulating the distribution and abundance of organisms; the study of the design of ecosystem structure and function.

Energy efficiency: Using less energy to provide the same level of energy service.

El Niño: A warm water current which periodically flows southwards along the coast of Ecuador and Peru in South America, replacing the usually cold northwards flowing current; occurs once every five to seven years, usually during the Christmas season; the opposite phase is called a **La Niña**.

Emissions: Substances such as gases or particles discharged into the atmosphere as a result of natural processes of human activities, including those from chimneys, elevated point sources, and tailpipes of motor vehicles.

Erosion: Displacement of solids (sediment, soil, rock and other particles) usually by the agents of currents such as, wind, water, or ice by downward or down-slope movement in response to gravity or by living organisms.

Epidemic: A widespread outbreak of an infectious disease in which many people are infected at the same time.

Externality: A cost or benefit that is not borne by the producer or supplier of a good or service. In many environmental situations environmental deterioration may be caused by a few while the cost is borne by the community; examples would include overfishing, pollution (e.g. production of greenhouse emissions that are not compensated for in any way by taxes etc.), the environmental cost of land-clearing etc.

Food security: global food security refers to food produced in sufficient quantity to meet the full requirements of all people

Forest: Land with a canopy cover greater than 30%.

Fossil fuel: Any hydrocarbon deposit that can be burned for heat or power, such as coal, oil and natural gas (produces carbon dioxide when burnt); fuels formed from once-living organisms that have become fossilized over geological time.

Freshwater: Water containing no significant amounts of salt.

Groundwater: Water located beneath the ground.

Geothermal energy: Energy derived from the natural heat of the earth contained in hot rocks, hot water, hot brine or steam.

Greenhouse effect: The insulating effect of atmospheric greenhouse gases (e.g., water vapor, carbon dioxide, methane, etc.) that keeps the Earth's temperature warmer than it would be otherwise.

Greenhouse gas: Any gas that contributes to the greenhouse effect

Hydrocarbons: Chemicals made up of carbon and hydrogen that are found in raw materials such as petroleum, coal and natural gas, and derived products such as plastics.

Hydroelectric power: The electrical power generated using the power of falling water.

Hydrological cycle (water cycle): The natural cycle of water from evaporation, transpiration in the atmosphere, condensation (rain and snow), and flows back to the ocean (e.g. rivers).

Industrial agriculture: A form of modern farming that refers to the industrialized production of livestock, poultry, fish, and crops.

Intercropping: the agricultural practice of cultivating two or more crops in the same space at the same time.

Intergovernmental Panel on Climate Change (IPCC): the IPCC was established in 1988 by the World Meteorological Organization and the UN Environment Programme to provide the scientific and technical foundation for the United Nations Framework Convention on Climate Change (UNFCCC), primarily through the publication of periodic assessment reports.

Irrigation: Watering of plants, no matter what system is used.

Kyoto Protocol: an international agreement adopted in December 1997 in Kyoto, Japan. The Protocol sets binding emission targets for developed countries that would reduce their emissions on average 5.2 percent below 1990 levels.

Land use, land-use change and forestry (LULUCF): Land uses and land-use changes can act either as sinks or as emission sources. LULUCF is terminology used in the UN Framework Convention on Climate Change whose Kyoto Protocol allows parties to receive emissions credit for certain LULUCF activities that reduce net emissions.

Mitigation: Activities undertaken as well as individual and collective behavioural changes aiming to limit human contributions to greenhouse gas emissions and global warming.

Monoculture: The practice of producing or growing one single crop over a wide area.

Natural resources: Natural substances that are considered valuable in their relatively unmodified (natural) form.

Non-Government Organization (NGO): A not-for-profit or community based organization.

Ocean acidification: Reduction in pH of ocean water that is caused by its uptake of carbon dioxide from the atmosphere.

Organic agriculture: A farming system that avoids the use of synthetic fertilizers, pesticides and genetically modified organisms, minimizes pollution of air, soil and water, and optimizes the health and productivity of interdependent communities of plants, animals and people.

Pathogen: any disease-producing agent (especially a virus or bacterium or other microorganism)

pH: A measure of the acidity or alkalinity of a solution, (where 7 is neutral and greater than 7 is more alkaline and less than 7 is more acidic).

Polluter pays principle: The principle that producers of pollution should in some way compensate others for the effects of their pollution.

Precipitation: Any liquid or solid water particles that fall from the atmosphere to the Earth's surface; includes drizzle, rain, snow, snow pellets, ice crystals, ice pellets and hail.

Reforestation: The direct human conversion of non-forested land to forested land through planting, seeding or promotion of natural seed sources, on land that was once forested but no longer so.

Renewable energy: Any source of energy that can be used without depleting its reserves. These sources include sunlight (solar energy) and other sources such as, wind, wave, biomass, geothermal and hydro energy.

Sequestration: The removal of carbon dioxide from the Earth's atmosphere and storage in a sink as when trees absorb CO₂ in photosynthesis and store it in their tissues.

Sinks: Processes or places that remove or store gases, solutes or solids – for example, forests are carbon sinks that result in the net removal of greenhouse gases from the atmosphere.

Stakeholders: Parties having an interest in a particular project or outcome.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Temperate: With moderate temperatures, weather, or climate; neither hot nor cold; mean annual temperature between 0–20 degrees C.

Tropical: Occurring in the tropics (the region on either side of the equator); hot and humid with a mean annual temperature greater than 20 degrees C.

United Nations Environment Programme: The United Nations Environment Programme (UNEP), established in 1972, works to encourage sustainable development through sound environmental practices everywhere.

Volatile: Evaporating readily at normal temperatures and pressures. The air concentration of a highly volatile chemical can increase quickly in a closed room.

Water table: Upper level of water in saturated ground.

Watershed: A water catchment area.

Weather: The hourly or daily change in atmospheric conditions which over a longer period constitute the climate of a region (see **climate**).

Wetlands: Areas of permanent or intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water not exceeding 6 m at low tide.

Wind energy: the energy present in the motion of the wind, which can be converted to mechanical or electrical energy. A traditional mechanical windmill can be used for pumping water or grinding grain. A modern electrical wind turbine converts the force of the wind to electrical energy for consumption on-site and/or export to the electricity grid.

List of contributors

List of guidebook authors

- Mike Shanahan, International Institute for Environment and Development
- Willie Shubert, Internews / Earth Journalism Network
- Cameron Scherer, Internews / Earth Journalism Network
- Teresa Corcoran, International Institute for Environment and Development

List of peer reviewers

- Kwame Karikari, Executive Director, Media Foundation for West Africa (MFWA)
- Emily M. Brown, Head of Department, Department of Media Technology, Polytechnic of Namibia
- Marina Joubert, Consultant in science communication, South Africa
- Patterson Siema, UNDP, Nairobi
- GPW Jewitt, Professor of Hydrology, School of Bioresources Engineering and Environmental Hydrology, University of KwaZulu-Natal
- Jonathan Diederiks, National Coordinator, Southern African Science Service Centre for Climate Change and Adapted Land Use (SASSCAL)
- Alinah Kelo Segobye, Department of History, Archaeology Unit, University of Botswana
- Rudo Sithole, Executive Director, International Council of African Museums (AFRICOM)
- Wokineh Kelbessa Golga, Associate Professor, Department of Philosophy, Addis Ababa University, Ethiopia.

List of UNESCO staff

- Fackson Banda (CI-HQ-Lead Sector)
- Jaco du Toit (CI-Nairobi)
- Jean-Pierre Ilboudo (CI-Dakar)
- Peter Dogse (SC-HQ)
- Youssef Filali-Meknassi (SC-Windhoek)
- John Crowley (SHS-HQ)
- Mulekeni Ngulube (CLT-Nairobi)
- Paul Mpayimana (ED-Addis Ababa)
- Abdoulaye Ibrahim (HQ-Africa Department)

This book responds to a very real need in African journalists' reporting of the complex phenomenon of climate change. Climate change poses a clear danger to lives and livelihoods across Africa. Journalists there have critical roles to play in explaining the cause and effects of climate change, in describing what countries and communities can do to adapt to the impacts ahead, and in reporting on what governments and companies do, or do not do, to respond to these threats. Yet research on public understanding of climate change and surveys of journalists reveal that across Africa the media can and should do more to tell the story of climate change. UNESCO produced this book to help fill this important gap.

UNESCO
Communication and Information Sector
7, place de Fontenoy
F-75352 Paris 07 SP, France
For information, contact Fackson Banda (f.banda@unesco.org)

