

Urmilla Bob, Salomé Bronkhorst (eds.)

Conflict-sensitive adaptation to climate change in Africa





Climate Diplomacy Series
Edited by Alexander Carius & Dennis Tänzler

ISBN 978-3-8305-2010-8

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BWV
BERLINER WISSENSCHAFTS-VERLAG

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliographie; detailed bibliographic data are available in the internet at <http://dnb.d-nb.de>.

ISBN 978-3-8305-2010-8

The publication has been made possible by the African Centre for the Constructive Resolution of Disputes (ACCORD) in cooperation with adelphi. Preparatory work and an expert seminar, hosted by ACCORD in September 2011, were supported through contributions by the Royal Norwegian Ministry of Foreign Affairs and the Swedish International Development Cooperation Agency (Sida). The publication of this volume was supported by a grant of the German Federal Foreign Office.

Cover illustration:
Panos Pictures / Mikkel Ostergaard

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Markgrafenstraße 12–14 · 10969 Berlin
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Dedication

This volume is dedicated to Dr Wangari Maathai (1940–2011), founder of the Green Belt Movement and the 2004 Nobel Peace Prize Laureate, for her dedication to peace, sustainable development and democracy in Africa.

Foreword by Tosi Mpanu-Mpanu

A number of developments at global policy and academic levels on climate change and conflict, and conflict-sensitive adaptation, provide impetus for this timely edited book volume.

Two such developments have taken place at international, UN level. The first such development has been that the security implications of climate change are receiving increasing attention at the UN Security Council (UNSC). The UNSC debated the issue in 2007; this was followed in 2009 by a report from the UN Secretary-General Ban Ki-moon outlining the possible security implications of climate change. However, as the body responsible for international security, the UNSC had not, until July 2011, formally recognised the security risks posed by climate change. In that month, discussions resulted in a Presidential Statement emphasising the importance of contextual information in addressing the security risks of climate change.

The second, perhaps even more prominent development has been at the UNFCCC (UN Framework Convention on Climate Change) negotiations in 2010, where among other things a Green Climate Fund was created. Developed countries had promised in 2009 that by 2020, funds to the tune of US\$100 billion per year would be transferred to developing countries for mitigation and adaptation projects – and the Green Climate Fund is understood to be an important instrument in this process. Some initial adaptation funds are already available, meaning that projects are already underway in many of the particularly vulnerable countries, which include large parts of Africa. There are several contestations and debates pertaining to adaptation funding and projects for Africa, particularly in relation to the scale and nature of funding required, and to the effectiveness and ability of projects to promote long-term sustainable development that increase local communities' capacity to respond to climate change impacts. Furthermore, if projects are poorly designed, it is not inconceivable that they could even exacerbate or cause conflicts in countries and local contexts where many people are vulnerable to conflicts and climate change, and where they depend highly on a changing environment for livelihoods. An essential way of designing appropriate interventions and policies is to base actions on accurate and complete science. This continues to be lacking, hence the controversy in the scientific community on the issue, as will be highlighted by some of the chapters in this volume.

The result of these two-fold developments at the UNFCCC and UNSC levels means that countries are increasingly demanding climate-sensitivity in peacebuilding and conflict-sensitivity in all aspects of climate adaptation.

The request by the UNSC for 'contextual information' also reflects the discussions at UN and academic levels about linkages between climate change and conflicts. While the discussion continues, the scientific community seems to have reached some

consensus – that climate change will at the very least be a threat multiplier, amplifying existing socio-economic, political and other factors that drive conflicts. In assessing these threats, a lack of accurate and complete data is especially problematic, for Africa in particular. This is further complicated by the level of detail or ‘granularity’ of data often required in order to understand the effects of climate change, which can have dissimilar effects on people on different sides of a hill. Thus, there is a need to understand specific contexts, requiring a much greater integration of local experiences and voices into science, to establish whether and how climate effects may cause conflicts in communities.

These developments in understanding are complemented by developments at the level of practice. While academics have erred on the side of caution, practitioners in development, peacebuilding and environmental management (to name a few) have had to contend with projects in which the role and interaction of the climate, conflicts and a changing environment are becoming increasingly prominent. The result is that the issue of climate change and security, and the need for adaptation to be conflict-sensitive, has been taken up by a number of local and international think tanks and NGOs (including multilaterals like the UNEP and UNDP, and conflict management organisations such as the African Centre for the Constructive Resolution of Disputes (ACCORD), directly contributing to understanding and action at UN level.

This volume seeks to make sense of a cacophony of voices from academia, policy-makers and practitioners on the topic. It also contributes understanding in an interesting and interdisciplinary way that can help work on climate change adaptation to be more conflict-sensitive. Critically, it provides conceptual chapters to help clarify ways to approach and think about this crucial issue.

Perhaps the book’s most significant contribution is that it brings together in a rigorous volume, diverse research and perspectives from across Africa and as far as Australia and the United States. Given the multifaceted nature of the impacts of climate change (and conflicts for that matter), the academic voices are diverse and multidisciplinary – from information technology, peace and security to legal, development and environmental experts, to name a few. Perspectives from NGOs and practitioners provide some of the crucial ‘granularity’ and local insights required to ensure conflict-sensitive adaptation to climate change.

Finally, the book is targeted at a wider audience that includes non-academics. This volume will likely be of interest to readers in diverse fields, including policymakers in security, development, environmental management, climate change adaptation, human rights and other fields; practitioners working across Africa in similar fields; and scholars and students in conflict management, peacebuilding, development, environmental sciences and related fields.

In closing, it is increasingly recognised that climate change represents a growing and potentially existential threat to many communities in Africa, and a fundamental

challenge to development across our wide and diverse continent. African countries – in seeking to avert this threat and to secure a better life for their people – have called for an approach based on science, equity and the rule of law. Any effort to deepen our understanding of the implications of climate change, and the complex relationships between climate change, security and other facets of human development, are to be welcomed. I hope that all engaged in this field – including those who benefit from the insights and knowledge contained in this timely volume – will contribute to the effort we must make together to curb climate change and secure a safer and better future.

Tosi Mpanu-Mpanu

Former Chair of the African Group of Negotiators on Climate Change for the UNFCCC

Director of the Clean Development Mechanism (CDM) Designated National Authority of the Democratic Republic of Congo (DRC)

Foreword by Miguel Berger

Given the security impacts of climate change worldwide, the topic of geopolitical adaptation to climate change has increasingly become a focus of foreign policy. To preempt cross-border tension and conflicts, timely action is needed to tackle the problems of water shortages, decreasing agricultural productivity or the destabilising effects of extreme weather events such as floods, storms and droughts. As part of its climate diplomacy initiative, the German Federal Foreign Office has been emphasising the need for foreign policy to listen to and understand the perspective of local experts and policymakers regarding climate change impacts and potential solutions. In reaching out to partners around the world, we not only seek to raise awareness and explore new ideas on how we best mitigate climate change, but also deal with its global political consequences. Our initiative thereby supports the international climate negotiations, but it also goes further by helping to demonstrate the benefits of climate protection for our collective security, prosperity and well-being to a global audience.

This also holds true for Africa, where we supported regional dialogues in Pretoria (2011) and in Addis Ababa (2012 and 2013) to strengthen the cooperation with partner governments and members of civil society. As part of these dialogues, diplomats highlighted the broad benefits that early action on climate change can have for the countries of the region and to foster regional cooperation, for example in the field of trans-boundary water management. Against this backdrop, we strongly endorse this publication ‘Conflict-sensitive adaptation to climate change in Africa’ published by ACCORD in cooperation with adelphi as part of the Climate Diplomacy Series. The authors of this book have outlined important findings on the relevance of diverse climate risks for African countries and present policies and tools for conflict-sensitive climate change adaptation. The German Government has been supporting applied research on the interrelationship of adaptation and peace and stability – this research also found its way into this publication. Doing so, the authors identify entry points for formulating and implementing early actions by stakeholders at all levels – local, national as well as transnational. I trust that the publication will encourage decision makers and practitioners alike to engage in joint efforts, thus combating climate change in a way that facilitates transformative change and contributes to peace and sustainability.

Miguel Berger

Commissioner for Globalization, Energy and Climate Policy, German Federal Foreign Office

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Acronyms and Abbreviations

ACCORD	African Centre for the Constructive Resolution of Disputes
ACHPR	African Commission on Human and Peoples' Rights
ACLED	Armed Conflict Location and Events Dataset
AGRHYMET	<i>Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle</i>
AMAP	Arctic Monitoring and Assessment Programme
AU	African Union
AWS	Automated Weather Stations
BGAN	Broadband Global Area Network
BJP	Beyond Juba Project
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CCAPS	Climate Change and African Political Stability
CDC	Conservation Development Centre
CDM	Clean Development Mechanism
CECORE	Centre for Conflict Resolution
CEWARN	Conflict Early Warning and Response Mechanism
CFA	Cooperative Framework Agreement
CFR	Central Forest Reserves
CICR	Centre for International Conflict Resolution
CILSS	Permanent Interstate Committee for Drought Control in the Sahel (<i>Comité Inter-Etate pour la Lutte contre la Sécheresse au Sahel</i>)
CLISEC	Research Group Climate Change and Security
CLiSAP	Climate System Analysis and Prediction
COP	Conference of the Parties
CPA	Comprehensive Peace Agreement
CSR	Corporate Social Responsibility
CSS	Centre for Security Studies
CSVR	Centre for the Study of Violence and Reconciliation
DAAD	German Academic Exchange Service
DDR	Disarmament, Demobilisation and Reintegration
DFG	German Science Foundation
DRC	Democratic Republic of the Congo
DUSP	Department of Urban Studies and Planning
ECC	Environment, Conflict and Cooperation
EEZs	Exclusive Economic Zones
EIDHR	European Instrument for Democracy and Human Rights
ECOWAS	Economic Commission of West African States
ECV	Essential Climate Variables

ESA	Environmental Security Assessments
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations
FEWS NET	Famine Early Warning Systems Network
FOEME	Friends of the Earth Middle East
FPIC	Free, prior and informed consent
GCLME	Guinea Current Large Marine Ecosystem
GCOS	Global Climate Observing System
GDP	Gross Domestic Product
GECHS	Global Environmental Change and Human Security
GEF	Global Environment Facility
GoK	Government of Kenya
GEF	Global Environment Facility
GPS	Global Positioning System
GTZ	Gesellschaft Technische Zusammenarbeit
HD	Henry Dunant
HDI	Human Development Index
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HRIA	Human Rights Impact Assessments
ICGLR	International Conference on the Great Lakes Region
ICHRP	International Centre for Human Rights Policy
ICZM	Integrated Coastal Zone Management
IDI	International Development Institute
IFP	Initiative for Peacebuilding
IISD	International Institute for Sustainable Development
IOM	International Organisation for Migration
IP	Internet Protocol
IPC	Integrated Food Security Phase Classification
IPCC	Intergovernmental Panel on Climate Change
IRIN	Integrated Regional Information Networks
ITU	International Telecommunication Union
IUCN	International Union for the Conservation of Nature
JEM	Justice and Equality Movement
LAPA	Local Adaptation Plans of Action
LRA	Lord's Resistance Army
MBA	Masters in Business Administration
MEA	Millennium Ecosystem Assessment
MEND	Movement for the Emancipation of the Niger Delta
MIT	Massachusetts Institute of Technology
MMER	Mobile Medical Emergency Responders
NA	Native Administration
NASA	National Aeronautics and Space Administration

NBI	Nile Basin Initiative
NEAP	National Environment Action Plan
NEMA	National Environment Management Authority
NEMP	National Environment Management Policy
NFA	National Forestry Authority
NGOs	Non-governmental Organisations
NOAA	National Oceanic and Atmospheric Administration
NORAD	Norwegian Agency for Development Cooperation
NRM	Natural Resource Management
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
ODI	Overseas Development Institute
ORASECOM	Orange-Senqu River Commission
OSCE	Organisation for Security and Co-operation in Europe
RAST	Resource Abundance and Scarcity Threshold
RBOs	River/Lake Basin Organisations
REDD	Reducing Emissions from Deforestation and Degradation
RICA	Regulation of Interception of Communication Act
RLP	Refugee Law Project
RSS	Really Simple Syndication
SABAP	Southern African Bird Atlas Project
SADC	Southern African Development Community
SECS	Sudan Environmental Conservation Society
SEI	Stockholm Environment Institute
SIM ^a	Security in Mobility
SIM ^b	Subscriber Identity Module
SLA	Sudanese Liberation Army
SPLM/A	Sudan People's Liberation Movement/Army
SRTM	Shuttle Radar Topographic Mission
SWAC	Sahel West Africa Club
TNCs	Transnational Corporations
TUPADO	Turkana Pastoralist Development Organisation
UCDP	Uppsala Conflict Data Programme
UK	United Kingdom
UN	United Nations
UNDPA	United Nations Department of Political Affairs
UNDP	United Nations Development Programme
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNMIS	United Nations Mission in Sudan

UNSC	United Nations Security Council
UNU	United Nations University
USA	United States of America
USAID	United States Agency for International Development
USDS	United States Department of State
USGS	United States Geological Survey
VOS	Voluntary Observing Ship
WACCAF	Water, Climate Change, and Crisis Assessment Framework
WBGU	German Advisory Council on Global Change (<i>Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen</i>)
WFP	World Food Programme
WMO	World Meteorological Organisation
WRI	World Resources Institute

Preface

As a relatively new field, the various ways in which the effects of climate change, and climate change adaptation projects, can contribute to or even prevent conflicts in Africa, require further analysis. Additionally, the highly multidisciplinary nature of the policy and practice of conflict-sensitive adaptation (for example, the need for adaptation to include development, environment, and peacebuilding considerations) are in their infancy, and need further analysis and the development of tools and policy recommendations. However, the academic debates and disagreements on the exact linkages between climate change and conflict have, in part, contributed to the lag in policy and practical work on ensuring that climate change adaptation is conflict-sensitive¹. This edited volume addresses some of these gaps by building on the work of academics and recent work of practitioner organisations and think tanks on the issue.

Whether natural, or caused by humans, it is becoming clear that climate change is a reality that will affect the entire globe. Our concern should be for the poorest Africans, many of whom are highly dependent on natural resources for their living. In turn these resources are being affected by the changes in temperature, rainfall, sea levels and ocean acidification as a result of climate change. By not focusing solely on the linkages between climate change and conflict in Africa, this volume takes the discussion further, considering conceptual issues, highlighting key thematic issues of concern for adaptation in Africa, as well as considering case studies, tools and policies for conflict-sensitive adaptation to climate change. To our knowledge, no such book has been written yet, neither in general terms nor on Africa specifically.

This book brings together not only the voices of academics, but also of practitioners and policymakers. Furthermore, it provides a mix of voices from across the globe, with 8 out of 14 articles authored or co-authored by Africans. The book thus strikes a balance between including the voices of African experiences on the ground by foregrounding context-specific and relevant research and experiences, and drawing from extensively conducted research (in particular quantitative studies). The book is written in four parts.

Part one focuses on conceptual and theoretical considerations for conflict-sensitive climate change adaptation in Africa. The first Chapter, by the editors and Simone Sala, which also serves as the introduction and conceptualisation for this volume, presents the science on climate change, and climate change-conflict linkages, before discussing conflict-sensitive climate change adaptation in some depth. The Chapter draws on existing literature and the chapters in this volume to highlight important considerations for

1 Conflict-sensitivity refers to approaches and measures that display a cognisance of how a) climate change can cause conflicts, b) climate adaptation projects themselves can cause or contribute to conflict, and c) adaptation measures would operate in conflict zones.

taking forward conflict-sensitivity in adaptation. Jennifer Mohamed-Katerere's Chapter focuses on the value of a strong human rights perspective in adaptation, which given the redistributive character of human rights, can help Africa reduce the risk of conflicts from policy responses to climate change. Jennifer outlines a range of benefits from viewing adaptation through a human rights lens, including in decision-making, in creating shared understandings and collaboration and in facilitating social learning and innovation. Jonathan Kolieb and Ellycia Harrould-Kolieb then expand the conceptualisation by offering a strong argument in favour of including corporates in conflict-sensitive adaptation, or more broadly, 'climate-sensitive peacebuilding'. In addition to discussing the theoretical contributions of corporates to peacemaking, peacebuilding and peacekeeping efforts, they provide a critique of existing international legal and regulatory mechanisms, and suggest some ways for concerned governments and civil society actors to help unlock the potential for corporate engagement in climate-sensitive peacebuilding.

Part two of the volume focuses on thematic concerns for conflict-sensitive climate change adaptation, including the effects of climate change and the conflict potential related to Africa's coasts, oceans and forests. The Chapter by Fathima Ahmed and colleagues focuses on human vulnerabilities and human insecurities in coastal zones. The authors concentrate on natural resource management (NRM) challenges in coastal zones in Africa. In their Chapter Ellycia Harrould-Kolieb and Jonathan Kolieb outline the considerable effects on human security and conflicts of climate change and ocean acidification. The authors argue that climate change and ocean acidification threaten to reduce the abundance and change the distribution of vital marine and coastal resources. For adaptation, boosting the resilience of marine ecosystems by reducing or removing other pressures will be paramount in the ability of coastal communities and economies to adapt to climate change and ocean acidification. In the final Chapter of part 2, Angella Nabwowe and Nokukhanya Mncwabe present lessons from Uganda's forest management, laws and policies for conflict-sensitive adaptation. In the context of existing conflicts involving forestry resources, they ask whether Uganda's environmental and conservation laws and policies as currently formulated and implemented, are sufficiently sensitive and responsive to citizens' needs.

Part three of the volume gives attention to issues related to drought, mobility and migration, with most chapters focusing or including research on the Sahel region. Nina von Uexkull's Chapter takes up the issue of armed conflicts arising from climate variability. By drawing on quantitative data and literature from 1990 – 2006, including from the Uppsala Conflict Data Programme Georeferenced Event Dataset, Nina finds little robust support for the theory that civil wars are driven by climate factors. Instead she finds that communal conflicts from climate variability are more likely – and especially so in the Sahel region. Also touching on the Sahel in parts, Curtis Bell and Patrick Keys centre their Chapter on potential policy responses to droughts, assessing the conditions under which food imports vs local food production would be most beneficial in terms of conflict prevention. The authors find that the risk of civil war is lower

when states have capacity to secure and distribute imported food. However, in weaker states imported food has no effect and therefore the promotion of domestic food production may be an appropriate adaptive response to drought in weaker states. Dennis Hamro-Drotz, in his Chapter, presents key findings from a larger study on the Sahel and neighbouring states, undertaken by the UNEP and others. The Chapter focuses on migration, using compelling maps to detail historical climate trends and discusses how these trends contribute to migration and/or conflicts. Dennis forwards important considerations for migration-sensitivity in adaptation for the Sahel region.

The two final chapters in this part of the volume focus specifically on pastoralism in the drylands of Africa. Salomé Bronkhorst assesses the viability of pastoralism as a form of adaptation to climate change in the state of Southern Kordofan, Sudan. By analysing what gives rise to conflicts between and within pastoral groups, Salomé identifies important aspects that contribute to conflicts and resource scarcities, including land legislation and policies, and a decline in traditional authorities, historically responsible for NRM and conflict resolution between tribes. Janpeter Schilling and colleagues in turn concentrate on pastoralism in the Turkana region of Kenya, analysing linkages between climate change and livestock raiding in that region. Based on their study findings, they put forward the 'Resource Abundance and Scarcity Threshold' (RAST) hypothesis, which aims to explain contradictory findings between the occurrence of raiding during periods of resource scarcity and during periods of resource abundance. Their recommendations also focus on the importance of inter-communal conflict prevention and resolution mechanisms.

Finally, part four includes three chapters that make contributions to policies and tools for conflict-sensitive climate change adaptation. Dennis Tänzler and Lukas Rüttinger put forward an analytical tool, WACCAF. By drawing on water and conflict literature, and water as a source of cooperation and conflict, the WACCAF tool contributes to the design of conflict-sensitive adaptation processes in a very tangible manner. In doing so, it serves as a crucial bridge between the theory and practice of adaptation. Steve Chan and his colleagues focus on 'crowd-sourced' electronic data gathering to detect the environmental and social consequences of climate change on the African continent. The authors explore the exciting possibilities of mobile phones and social media in contributing to data collection to strengthen the scientific basis of research and interventions. While technical, the Chapter is accessible and readable, and provides important possibilities for strengthening the empirical basis for adaptation. The final Chapter of this volume, by Simone Sala and colleagues, expounds on the possibilities of mediation as a tool in conflict-sensitive adaptation to climate change. The authors explore existing challenges in the mediation field, assess mediation strategies that may be of relevance for adaptation, and discuss opportunities for mediation in negotiated peace agreements in Africa, where natural resources are addressed as part of those agreements.

Annex A, a Memorandum for Action, by adelphi, takes a much more practical approach. The Memorandum differs from the rest of the chapters in this volume, in that it is a short, succinct and importantly, an actionable document that can be used by the policy community and practitioners to take practical steps towards conflict-sensitive adaptation to climate change. In a sense, it is a ‘take away’ document which draws not only on this volume but on a recent research project undertaken by the authors and international discussions at the EU and UN levels.

Acknowledgements: The publication of this volume, including all preparatory work and an expert seminar held in September 2011, has been made possible by ACCORD in cooperation with adelphi, through the generous contributions of the governments of Sweden, Norway and Germany. We thank every author for their unique and fundamental contributions to this volume, for their scholarship, and for their patience during the review process. We are also grateful to colleagues at ACCORD and adelphi for their work in making this book possible and publishable. Appreciation is also extended to Berliner Wissenschafts-Verlag.

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South Africa, 11 March 2014

I.

**Conceptual and theoretical considerations for
conflict-sensitive climate change adaptation in Africa**

Climate change and conflict: Conflict-sensitive climate change adaptation in Africa

Urmilla Bob, Salomé Bronkhorst and Simone Sala

Abstract

The climate is changing and some consensus is starting to emerge on how the impacts of such changes could contribute to or cause conflicts in Africa. While those finding direct correlations between climate change impacts and different types of violent and non-violent African conflicts are still in the minority, researchers are increasingly agreeing that climate change at the very least acts as a threat multiplier that may cause conflicts in communities or states already vulnerable as a result of other factors – social, political and economic to name a few. This Chapter serves as an introduction to this book volume and outlines the climate science, including the existing and emerging literature on the linkages between climate change and conflicts in Africa. It then explores the main sources of Africa's vulnerability to climate change, before discussing how climate-related conflicts may be manifested. The second half of the Chapter focuses on conflict-sensitive adaptation to climate change, assessing the state of the art and, by drawing on literature presented and the Chapters in this book volume, puts forth considerations for ensuring conflict-sensitivity in adaptation.

Key words: climate change, conflict, conflict-sensitive, adaptation, ocean acidification

Introduction

The actual and potential linkages between the environment, climate change and conflicts are critically important for Africa, which is seen as the region of the world most vulnerable to the impacts of climate change (IPCC 2007). Existing environmental, socio-economic and political factors create vulnerabilities, making communities less resilient against the predicted consequences of ocean acidification (the result of excess CO₂ in the atmosphere) and climate change. The latter is expected to lead to changes and higher levels of variability in rainfall, temperatures and sea-levels. Poor Africans, who are in the majority, make up a significant proportion of those seen as vulnerable, given existing weaknesses, high dependence on climate-affected resources (such as land and water) and low adaptive capacity (African Development Bank Group et al. 2011; Brown et al. 2007; Brown & Crawford 2009).

In light of these predicted impacts, the role of the environment in social conflicts (including communal, inter-state and non-state conflicts) is receiving increased attention. Conflict resolution experts in particular are examining conflicts from a climate and environment lens, aiming to determine causality (if any) and to identify appropriate intervention strategies. Some conflicts, such as those in Darfur and pastoral con-

flict in the Horn of Africa, are strongly linked by some to the climate and environment¹ (Omolo 2010), while others categorise them as predominantly political, ethnic or economic (Buhaug 2010; Sunga 2011).

These controversies and climate change predictions demand more critical analyses of, and more data on, contemporary African conflicts to unpack underlying influential factors, including climate factors such as temperature, rainfall and sea level rise. Additionally, the focus on and funding for adaptation to climate change is currently central among policymakers, researchers, donor agencies and NGOs addressing climate change issues. This was particularly evident during the December 2011 COP 17 (17th Conference of the Parties to the UNFCCC), during which funding instruments for adaptation were agreed upon. However, while adaptation to climate change is an important area of research and policy development, the potential links between climate change and conflicts provide impetus for seeking answers relating to this potential nexus. This is crucial for adaptation policy formulation and the development of implementation strategies, especially as they relate to Africa.

In light of this, and as a relatively new field, the various ways in which climate change and adaptation projects can contribute to, or even prevent, conflicts in Africa require further analysis. Furthermore, the highly interdisciplinary nature of the policy and practice of conflict-sensitive adaptation is in its infancy, and needs further examination, conceptualisation and the development of tools and policy recommendations. This Chapter – and other chapters in this volume – highlights the need for conflict-sensitive climate change adaptation in Africa and examines key thematic, policy, strategic and implementation issues and concerns. This volume presents current research on the linkages between climate change and conflict in Africa, and provides analyses of tools, policies and approaches to ensure that conflicts arising from climate change are addressed and climate change adaptation measures are conflict-sensitive.

The rest of the Chapter is written in two parts. Part one takes stock of the science on climate change, and climate change and conflicts in Africa. It also explores the sources of Africa's vulnerability to these forces, and discusses how climate-related conflicts may be manifested. Part two explores conflict-sensitive adaptation to climate change in Africa, drawing on existing literature and the chapters of this volume. It assesses the state of the art and puts forth considerations for ensuring conflict-sensitivity in adaptation.

1 Ban Ki-moon (2007) A climate culprit in Darfur. Washington Post, June 16.

Climate change and conflicts in Africa

Climate science on Africa

Climate is defined as the average state of the atmosphere for a given time scale (hour, day, month, season, year, decades and so forth) and generally for a specified geographical region (Houghton 2002). Climate change is any change in climate over time caused by natural variability or human activities (IPCC 2007). A similar definition is provided by Houghton (2002), who states that climate change is defined as a change of climate which is attributed indirectly or directly to human activities that alter the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Climate variability refers to variations in the mean state of climate on temporal and spatial scales beyond that of individual weather events; examples of climate variability include extended drought, floods, and conditions that result from periodic El Niño and El Niña events (Hegerl et al. 2007).

The weight of scientific evidence indicates that the climate is changing, largely as a result of human activities, and that these changes and the variability in rainfall patterns, temperatures and sea levels will result in far-reaching, global consequences. While positive outcomes linked to climate change are possible in some regions currently lacking water – for example, in some parts of South-East Asia more water may become available (Nelson et al. 2002) – it is generally accepted that the range of impacts will be mostly negative and will include several ecological and socio-economic consequences which will directly and indirectly affect livelihoods, human health and environmental integrity. Changes in temperature and rainfall including their extremes are likely to have several adverse impacts including the distribution of biomes in the world, crop growth, land degradation, desertification, freshwater resources (with resultant impacts on water supply and water demand), sea-level rise, storms (typhoons and hurricanes), floods and droughts (Brody et al. 2008). There is consensus that the effects of climate change will likely be felt hardest in Africa, due to existing vulnerabilities, the local lack of knowledge and technologies, and state fragility (Brown et al. 2007; Brown & Crawford 2009; Osbahr et al. 2008). Moreover, in many parts of Africa climate change pressures are compounded by weak institutions, competing livelihoods and inequalities in income distribution (Osbahr et al. 2008).

Data for Africa reveals that the warming rate is higher than the average (Collier et al. 2008), and changes in various African ecosystems are already being detected, at a faster rate than previously anticipated (IPCC 2007). According to Arnell (2006), water stress is likely to increase in northern and southern Africa, while it is expected to decrease in eastern and western Africa by 2055. Projections by the IPCC (2007) suggest that 75 to 250 million people living in Africa could face water stress by 2020 due to climate change. Moreover, food security is likely to be severely compromised by climate variability and change (IPCC 2007), even if the range in which African countries will be affected remains very broad (Maddison et al. 2006). Some countries like Ethi-

opia and Mozambique are even expected to benefit from climate variations (Thornton et al. 2006). In this volume, Hamro-Drotz (based on a large study conducted by UNEP and a number of prominent international organisations on 17 states in the Sahel and neighbouring regions) finds that for the Sahelian countries and some of their neighbours mean seasonal temperatures have increased. In addition, rainfall has increased together with rainfall variability resulting in increasing flooding risk and drought events (given that rains fall in less frequent but more intensive events). The study also found wider and more severe inundation from flooding.

The twin threats of ocean acidification and climate change pose significant threats to African economies. In this volume Harrould-Kolieb and Kolieb outline the widespread impacts of ocean acidification on African marine ecosystems, and their resultant impacts on livelihoods and economies. Climate change, while posing a threat to economies also may affect infrastructure, due to the inundation of low-lying lands by rising sea levels (IPCC 2007) and the additional demands on infrastructure placed by climate-induced displacement (McLeman & Smit 2004; Myers 2002). There are also net adverse impacts on human health due to direct causes like increased severity of heat waves and indirect effects such as changes in local food productivity and in the range of water and vector-borne diseases transmitted by organisms (Brody et al. 2008). The distribution patterns of various human diseases, such as malaria in the East African highlands and Southern Africa are expected to change (Chen et al. 2006; Pascual et al. 2006), further affecting human health (Hartmann et al. 2002).

However, scientific study of the specific effects of climate change on already vulnerable African regions (such as the western Sudano-Sahelian region) (IPCC 2007), as well as on the future intensity and frequency of extreme events (IPCC 2007) has yet to reach any final conclusions. This is both due to the lack of adequate historical climate data on Africa (Giannini et al. 2008; Jenkins et al. 2002; Stuu et al. 2008) and the high agro-ecological variability of the African continent (Magagi et al. 2010; Thiombiano & Tourino-Soto 2007; World Bank 2007), making the downscaling of climate change scenarios at the sub-regional level extremely complex (IPCC 2007; SEI 2008). Furthermore, given the size and diversity of Africa, it is increasingly accepted that the continent itself cannot be considered as a singular unit of analysis – whether from a scientific or socio-political perspective.

The African climate-conflict nexus

Numerous scientific studies assess the actual or potential impact of climate change on conflicts in Africa and beyond (cf. Butler & Gates 2012; Dabelko 2009; Gleditsch 2012; Hendrix & Salehyan 2012; Nordas & Gleditsch 2007; Raleigh & Kniveton 2012; Reuveny 2007; Theisen 2012; Swain et al. 2011). The issue has also been taken up by

policymakers (OSCE 2009; SWAC & OECD 2010) and the public media². At the international level, the UN dedicated a session to discuss climate change as a security issue, and the UN Security Council is currently discussing the opportunity to schedule regular debates on climate change and security as well as appointing a Special Adviser to analyse climate change-induced risks posed to national sovereignty (Goldenberg 2011).

The results of the above investigations and efforts indicate that the pathways through which climate change may cause or contribute to conflicts are complex and highly context- and time-specific, leading to significant scientific debate on the matter. The absence of a consensus on a clear causal connection between climate-affected natural resources and conflicts has been the target of substantial criticism. Even if a good number of studies have recognised the importance of climate variability and change as a co-factor in rising tensions (Hendrix & Glaser 2007), their weight in determining conflict is downplayed when compared to other political and socio-economic factors such as poverty and governance variables (Salehyan 2008; Theisen 2012) including property rights (Butler & Gates 2012). That said, according to UN Secretary General Ban Ki-moon³, Africa has been the theatre of the first climate change ‘wars’ (alluding to the conflict in Darfur); even though others would argue that natural resources had little impact on the onset of these crises (Abraham 2007; Buhaug 2010; Sunga 2011). Equally controversially, the IPCC’s 2007 report – and especially the section that focuses on the social implications of climate change – are criticised by some for relying on secondary and numerous non-peer reviewed sources (Gleditsch 2012). To complicate matters further, the linkages between climate change and security actually depend on the definition of security itself, which changes over time (Wæver 2004) and can span from hard to soft security (de Ville 2008). In this volume, the range of definitions for ‘conflict’ is illustrative of this phenomenon. Definitions for and foci on conflicts vary widely, from ‘social conflicts’ to ‘armed conflicts’ (including interstate and intrastate conflicts), ‘communal conflicts’ to non-violent conflicts, ‘contentions’ or ‘contestations’).

Despite these uncertainties and challenges, an assessment of the available literature indicates that there may be consensus on two broad issues. First, that climate change can cause changes in the availability of resources. This happens through sudden climate events (e.g., floods or droughts) or through slower changes and variability, such as changes in temperature and rainfall. The threat of conflict in Africa is in part due to

- 2 Climate change to hit security, *The Australian (Canberra, A.C.T.)*, 10 August 2009; Clonan T, Climate change ‘threatens EU security’, *The Irish Times*, 25 April 2008; Climate change and food security, *The Economic Times*, 5 May 2009; Friedman R, Erdan: Climate change poses national security risk, *The Jerusalem Post*, 29 December 2010; McLeman R, Climate change a security issue, *Windsor Star*, 14 December 2009; Climate change ‘threatens security’, *Sunday Times*, 17 December 2006.
- 3 Ki-moon B, A climate culprit in Darfur. *Washington Post*, 16 June 2007.

high resource dependence, which can lead to a competition in resource use over scarce or abundant resources (Raleigh & Kniveton 2012; Hendrix & Salehyan 2012) and may consequently contribute to conflicts (IPCC 2007). The climate plays a key role in the well-being of the majority of Africans, with economies highly reliant on climate-driven natural resources (Collier et al. 2008). Agriculture continues to be the main economic activity in Africa, accounting for an average 70% of employment and 30% of GDP (Asmah & Kimenyi 2011). This high dependence on natural resources (including water, land and marine life for livelihoods), coupled with low institutional capacity to manage those and high value resources (such as oil, timber and gas) makes Africa highly susceptible to climate-related shocks, resource competition and violent conflict. The second area of apparent consensus is that climate change can exacerbate existing threats to peace and security in Africa. Climate change is a threat multiplier (WGBU 2007) that may intensify existing social, economic, political and environmental problems that communities are facing already; exacerbate grievances; overwhelm coping and adaptive capacities; and at times spur forced or proactive migration.

According to Barnett and Adger (2007), climate change-induced conflicts can be grouped into two broad categories of analysis: (a) conflicts triggered by changes in energy and economic policies aimed at mitigating anthropogenic climate change, and (b) conflicts due to changes in those social systems directly or indirectly impacted by climate variations. The latter category particularly refers to social systems in which a change in the availability, distribution and/or utilisation of natural resources can drive conflict at communal, state or interstate level. These causes and effects are unlikely to be distributed evenly across the globe and Africa; researchers have found that resource scarcity in a globalising world affects those on the margins of the global economy first and hardest (Matthew 2008).

It is becoming clearer that, combined with existing vulnerabilities and poor adaptive capacity, climate changes could have significant consequences for regional stability (Miguel et al. 2004). Some African regions are especially vulnerable to conflicts, including West Africa and the Nile Basin (Stern 2007). North African and, as noted, Sahelian countries, are increasingly likely to experience food and water crises due to water scarcity and climate variability; such crises could provoke vulnerable communities to migrate and pastoralists to change their migratory routes, causing tensions between local communities (cf. Scheffran 2008; Hamro-Drotz 2012 in this volume).

More recent studies provide more sophisticated understandings of the actual and potential linkages between climate variables (such as rainfall) and conflicts. Hendrix and Salehyan (2012), using a broader definition of conflict, find that rainfall variability has a significant effect on large- and small-scale political conflicts; extreme variability (wetter or drier) is positively correlated with conflict. The authors find more violence following abundant rainfall. Raleigh & Kniveton (2012) find that rainfall variability is linked to rebel and communal conflicts. They find that both scarcity and abundance

drive small-scale conflicts, with more rebel conflicts in unseasonably dry times, and more communal conflict in unseasonably wet times.

Some compelling considerations on climate-conflict science are emerging from the authors of this volume. Bell and Keys argue that the weak Sudanese state capacity to respond to droughts and the conflict in Darfur was a key driver for the perpetuation of that conflict. As argued by Schilling et al., our concerns should not only be about the results of climate-related resource scarcities; the authors hypothesise that climate-related abundance of resources could also contribute to contentious behaviour among pastoralists in the Turkana region of Kenya. Also in this volume, Von Uexküll's statistical analyses demonstrate that communal conflicts resulting from climate factors appear more likely than interstate or intrastate armed conflicts. Bell & Keys argue that for weaker states, the import of foreign food in times of drought has no effect on the onset of armed conflicts, indicating that governance is a key variable. Finally, Hamro-Drotz demonstrates some significant changes in climate indicators over the past 40 years for the Sahel and discusses in some depth the resultant effects on migration and conflicts.

The sources of Africa's vulnerability to climate change and conflicts

Many African countries are still characterised by high levels of poverty; poor social services and infrastructure; livelihoods (including agricultural production and ecotourism) reliant on the natural resource base which is sensitive to climate variability; high percentages of urban poor who are vulnerable to natural hazards; and high levels of migration (sometimes as a result of climate factors). Furthermore, these states and their communities frequently have little capacity to cope with or adapt to disasters or changes (including climate stressors). Environmental conflicts in these already weak states are often obfuscated by other more visible and prominent issues such as ethnic and religious tensions or political contestations and so on. In the same vein, what may be classed as environmental conflicts, often are the result of socio-economic, political and ethnic factors and inequalities.

The interaction of structural and other 'stressors' contributes to vulnerabilities in Africa (O'Brien et al. 2009). In turn, these vulnerabilities increase the probability for climate-related conflicts. For instance, increasing human vulnerability results in even higher dependence on climate-affected resources, which further increases human vulnerability through resource competition and scarcity (Shackleton & Shackleton 2012). Conflict itself exacerbates vulnerability through environmental degradation, because of the increased demand on resources as victims become impoverished and rely more on the natural resource base. However, the deliberate destruction of the environment is sometimes used as a weapon of war to destroy the resource base and livelihoods of communities (Levy & Vaillancourt 2011). Another feature of conflicts exacerbates vulnerability, that is, human rights violations, including sexual violence against women and children as well as human trafficking.

Poverty and economic inequality are major contributors to vulnerability as they limit the ability of individuals and communities to cope with change, and they drive conflicts in Africa (Collier 2008; Ward et al. 2010). Political marginalisation and ethnic tensions have been familiar features of post-colonial states, continuing to create vulnerabilities through their effects on conflicts, resource availability and capture (Homer-Dixon 1998). Governance is another challenge. When weak and corrupt, governments are unable to manage natural resources optimally and equitably. Especially at a local level, poor natural resource management is a key driver of vulnerability and conflicts in Africa (FAO 2000). At a macro level, poor governance, corruption and a lack of capacity specifically affect the ability of states to respond to hazards and to address vulnerabilities (Lewis & Mioch 2005). In this volume, Bell and Keys (2012) closely relate governance and the state's adaptive capacity, illustrating that, among others, corruption, a lack of social services, access to markets and infrastructure, and corruption (all of which relate to governance) are closely related to adaptive capacity and to hazard preparedness.

Other challenges contributing to vulnerability relate to the access, use and control of African resources. In addition to weak technological adaptive capacity (IPCC 2007), land and water scarcities are evident in many African states. Land scarcities result from land degradation, tenure insecurity, privatisation of land and agricultural development (Isumonah 2003; Van Leeuwen 2010) – issues that are mirrored in the chapters in this volume of Schilling et al. and Bronkhorst. Water scarcity results not only from poor management practices and weather variables, but also from population increases, poor institutional and traditional conflict resolution mechanisms, urbanisation, and economic development (Clanet & Ogilvie 2009; Mwang'ombe et al. 2011; UNDP 2006). Vulnerability is further exacerbated by a plethora of other factors, including high HIV/AIDS prevalence rates (Shackleton & Shackleton 2012), poor educational attainment, conflicts, declines in traditional institutions (see Bronkhorst in this volume), and environmental degradation. All of these factors limit the power and resources (or 'entitlements' [Sen 1981]) people need to mitigate or adapt to the effects of climate changes and variability.

Climate-conflict typologies or manifestations

In light of the controversies and uncertainties regarding climate change and conflict, there is the twin danger that climate effects on conflicts can either be ignored (because of a lack of scientific consensus) or overstated (by alarmists and those with other political agendas). Whichever happens, the result is maladaptation – that policies and interventions in conflicts and adaptation will miss the mark, again affecting the most vulnerable. However, the polemic surrounding the Darfur conflict and whether it is the world's first climate change war⁴ (Flint & de Waal 2006; de Waal 2007) is a clear

4 Borger J, Scorched, UK *The Guardian*, 28 April 2007.

illustration of how difficult it is to assign causality in any conflict. It is also illustrative of the importance, in conflict-sensitive adaptation, of one variable already mentioned – governance. As de Waal (2007) argues:

Is climate change the culprit for the disaster in Darfur? The answer is not simple ... I argue that climatic and environmental factors have compelled Darfurians to adapt their livelihoods and migrate southwards. These changes have been going on for centuries, but over the last thirty years, they have occurred at a faster pace and on a larger scale. But depleted natural resources and livelihood transformations cannot on their own account for conflict, let alone armed conflict. The most important culprit for violence in Darfur is government, which not only failed to utilise local and central institutions to address the problems of environmental stress in Darfur, but actually worsened the situation through its militarised, crisis management interventions whenever political disputes have arisen. In turn, violent conflict has worsened Darfur's ecological crisis.

Nonetheless, we need to start somewhere, and ample knowledge and data exist in history and existing academic literature on how changing environmental conditions (not necessarily linked to climate change *per se*) contribute to or cause conflicts. In order to prepare for climate change and adaptation, it is instructive to study these conflicts or their typologies. They may provide useful lessons for how to address changing environmental conditions, and the underlying socio-economic, political and other drivers of future climate-related conflicts. With this rationale, we may therefore expect climate-related conflicts or issues to manifest themselves in some of the following ways in Africa:

- Land disputes and conflicts, especially in contexts where groups are displaced as a result of extreme weather events or because of slow-onset changes in the environment (De Waal 2007).
- Water-related conflicts. These may occur at communal level (such as in Namibia – cf. Menestrey Schwieger 2010), over water sources such as wells (such as in Sudan – cf. Bronkhorst 2011) or at an interstate level over trans-boundary resources (such as international rivers – cf. Swain 2012).
- Contestations and violent conflict related to the management of, and high dependence on coastal zones and marine ecosystems in Africa (cf. in this volume Ahmed and colleagues, and Harrould-Kolieb and Kolieb).
- Increase in extreme weather events, such as droughts and floods, especially in the Sahel (including Darfur), which result in local competition over resources and displacement.
- Impacts of environmental and anthropogenic changes on forests, forest management, forest products and forest-related conflict in Africa (a Ugandan case is discussed by Nabwowe and Mncwabe in this volume).

- Conflicts between pastoralists and agricultural communities. Examples include pastoral-farmer conflicts in the Sahel region, as studied by Schilling et al. and Bronkhorst in this volume.
- Decrease in agricultural production which is a major threat to food security since as Bryan et al. (2009) warn, agricultural production remains the main source of livelihoods for most rural communities in Africa.

These types of potential or actual climate-related conflicts have several intended and unintended consequences which include increases in vulnerability, declines in livelihood options, migrations and displacement, and inciting further conflicts and exacerbating instability, poverty and general declines in human security. These impacts provide impetus for ensuring that conflict-sensitive adaptation to climate change (as discussed in the next section) is promoted.

Conflict-sensitive climate change adaptation

Adaptation and adaptive capacity

Mitigation measures and adaptation to the adverse impacts of climate change are the most crucial environmental concerns of many developing countries, and particularly of those in many parts of Africa (Denton 2002). Adaptation refers to changes in processes or structures to moderate or offset potential dangers or to take advantage of opportunities associated with changes in climate; mitigation is about preventing or limiting the occurrence of climate change (Brody et al. 2008; Denton 2002). Grothmann and Patt (2005) note that adaptation has emerged as central in climate change studies and assessments that inform mitigation policies and aim to reduce peoples' vulnerabilities to climate change impacts. Schröter et al. (cited in Grothmann and Patt 2005: 200) state: 'This has, in part, stemmed from a realisation that a certain amount of climate change will occur, and that society can take concrete steps to minimise the net losses (including taking advantage of opportunities for gains)'. Adger et al. (2007) define adaptive capacity as the ability or potential of a system to respond successfully to climate variability and change, the latter of which includes adjustments in behaviour as well as in resources and technology.

Adaptive capacity is influenced by the ability of human systems to adapt to and cope with climate change linked to a range of factors such as socio-economic status and security, technological know-how and options, educational and skills levels, access to information, infrastructure and services available, access to environmental resources as well as governance and management consideration. These factors make up part of the endowments which exist at the local level. There is a lot of variability amongst populations and communities in their endowments with these attributes, and developing countries (particularly least developed countries, many of which are in Africa) are

generally poor in this regard (Adger et al. 2007). Communities and countries with poor endowments are generally extremely vulnerable to climate change, with vulnerability being defined by Schneider et al. (2007) as the degree to which a system is susceptible to and unable to cope with adverse effects. The key parameters of vulnerability are the stress to which a system is exposed to, its sensitivity, and its adaptive capacity (Schneider et al. 2007). Therefore, a key component of adaptation is access to information and resources to plan responses (or adaptations) in a systematic manner.

An important consideration in adaptation is gender. In addressing the concerns of and impacts on disadvantaged groups, including women, it will be central to assert human rights in conflict-sensitive adaptation as argued by Mohamed-Katerere in this volume. Experiences, perceptions, impacts and responses linked to disaster events, including conflicts and climate-induced hazards are different for women and men (Aaron 2010; Nelson et al. 2002; Smyth 2009). These can be attributed to:

- different roles and responsibilities at household and community levels
- power dynamics (in decision-making and resource allocation)
- access to information and resources
- capacities and capabilities that influence fallback opportunities
- options to cope or adapt to changes
- high levels of discrimination in Africa as a result of persistent patriarchal practices.

For instance, Nelson et al. (2002) and Perry et al. (2010) highlight that because women in developing countries are often primary natural resource users and managers (for example, collecting firewood, forest products and water) they are often disproportionately affected by environmental degradation and conflicts. Furthermore, many households are reliant on women's labour in subsistence or cash cropping or on plantations which are often badly affected by floods and droughts (Hardee 2009). Understanding gender issues in relation to climate change and adaptation is important since, as Berrang-Ford et al. (2011) and Demetriades and Esplen (2008) show, women and men can play specific roles in climate change adaptation and mitigation.

Strategies to adapt

There is a rich database emerging that identifies strategies used by or in vulnerable communities to respond to climate change and/or variability (including in conflict-prone areas) (cf. Care n.d.; Bronkhorst 2011; De Kock 1980; Oba & Lusigi 1987; Stark et al. 2009; Ziervogel et al. 2008). Key strategies identified relate to:

- Infrastructural developments, such as road, dam or seawall construction

- Changes in agricultural practices (especially increase in intercropping, changes in types and number of crops grown, increase in planting regimes, increasing drought-resistant fodder crops, changes in tillage practices, changes in cropping periods, etc.)
- Changes in pastoral practices (changes in transit routes, increasing livestock sizes, moves to agro-pastoralism)
- Sale of and/ or diversification in livestock and other household assets
- Improving land fertility
- Restricting soil erosion/ land reclamation and enhancement
- Water harvesting and storage
- Migration (sometimes voluntary but often forced)
- Institutional development

Few studies examine the long-term implications of adopting these strategies, especially if the strategies such as restrictions on resources and migration fuel further conflicts. While larger international development organisations and bilateral donors are increasingly demanding climate sensitivity in development programming (cf. Stark et al. 2009), it is clear that conflict-sensitivity in relation to adaption strategies becomes important. But what is conflict-sensitivity?

Defining conflict-sensitivity

Conflict-sensitivity is a term familiar among practitioners, especially in the fields of development, humanitarian aid and peacebuilding. It has a double meaning. Conflict-sensitivity in conflict or post-conflict areas relates to the effects a conflict may have on a particular location, project, group dynamic or intervention. Conflict-sensitivity can also mean being cognisant of the potential conflict-effects an intervention or, say, an adaptation measure might have. According to the Conflict Sensitivity Consortium⁵ (nd), the term means: '[t]he ability of your organisation to understand the context in which you operate; understand the interaction between your intervention and the context; and act upon the understanding of this interaction, in order to avoid negative impacts and maximise positive impacts'. Conflict-sensitivity in climate change adaptation, according to Yanda and Bronkhorst (2011), also refers to understanding how climate change may cause conflicts. In light of the scientific controversies and uncertainties, academics have not exactly leapt at the opportunity to conceptualise conflict-sensitivity in ad-

5 The Consortium is funded by the UK Department for International Development (UK Aid) and comprises 37 agencies – most of the major development, humanitarian and peacebuilding agencies on the globe, including ActionAid, CAFOD (Catholic aid agency for England and Wales) and Save The Children (www.conflictsensitivity.org).

aptation. That said, as indicated, there is consensus that climate change will be a threat multiplier and that already vulnerable states and peoples will be disproportionately affected. To prevent growing vulnerabilities and, possibly, conflicts, there is a need to introduce adaptation measures that are conflict-sensitive (Tänzler et al. 2010; Smith & Vivekananda 2007). But how can conflict-sensitive adaptation to climate change in Africa be secured? This is the focus of the next and final section.

Securing conflict-sensitive adaptation to climate change in Africa

What we hope to have demonstrated so far is the need for conflict-sensitive adaptation in Africa, where conflict, climate change and variability impacts are and will be affecting the most vulnerable, resource-dependent communities. The literature presented in this Chapter, and the contributions made by each chapter of this volume, provide useful guidance on how to secure conflict-sensitive adaptation to climate change in Africa. The rest of this Chapter will explore a few of the most compelling insights.

Changing conceptual perspectives can change the focus of policies and interventions

The evolving climate change-conflict nexus provides a basis for re-examining constructs, especially from a multidisciplinary perspective, seeking new ways to explain and predict climate phenomena and conflicts. We have demonstrated that many scholars have been conceptualising the African climate-conflict nexus from a scarcity or disaster perspective. However, recent contributions by Adano et al. (2012) and others (as per Schilling et al. in this volume) indicate that resource abundance may deserve more prominence than it has been given. (As noted, these findings are mirrored by Von Uexkull in her Chapter in this volume). Schilling and his colleagues however also find that certain thresholds of resource abundance and scarcity need to be reached to cause conflicts in Turkana, Kenya. This is a particularly interesting hypothesis as it (re)broadens the current scope of inquiry to one of *resource availability* and calls for the identification of thresholds for both abundance and scarcity.

Apart from the fact that this is an interesting development in our understanding of the problem, it is also incidentally the case that changing the focus from resource scarcity (a ‘problem’) to resource availability (a neutral aspect) also creates opportunities for capitalising on the potential positive impacts of climate change. Positive impacts may well not necessarily be ‘abundance’ of a resource, but may include cases where communities and nations are able to capitalise on changes in the availability of resources as a result of climate change. (For example even drier conditions, if managed, could be beneficial in terms of rearing particularly profitable livestock or growing profitable crops. Of course wetter conditions, if adequate infrastructure and technologies are put in place, can also be highly beneficial for local communities).

The broader implication is that by viewing the availability of resources as an opportunity, conflict-sensitive adaptation becomes something more than merely tackling climate change and putting out conflict fires. This is in line with the Conflict Sensitivity Consortium, Yanda and Bronkhorst (2011) and Tänzler et al. (2010), who argue that conflict-sensitive adaptation should also concern itself with the positive, broader impacts of climate change or adaptation interventions. Projects should therefore be a ‘no regret’ strategy (Füssel 2007) that make contributions to development and peacebuilding by preventing conflicts and building resilience, even if the climate impacts do not turn out to be as severe as predicted (cf. Tänzler et al. 2010). Tänzler et al. (2010: 4), for instance, argue that conflict-sensitive adaptation includes:

... socio-political transformation toward a society capable to resolve potential or actual resource conflicts [that] may also be able to resolve disputes in other areas. In addition, to confront the security risks induced by climate change it is important to harness the direct co-benefits of adaptation for peacebuilding on a more local, project based level. This, for example, includes the creation of conflict sensitive adaptation programmes with a positive transformative effect.

The importance of contexts and a community-focus

A focus on the community level appears also to be critical. As confirmed by Von Uexkull in this volume, communal conflicts (rather than intrastate conflicts) are more likely to result from climate change. It is also logical to deduce that the impacts of climate change will be felt at a local level first, before they become ‘visible’ at national and international levels. However, particularly at the local level among poor communities in Africa, there is very little if any adaptive capacity. In fact, responses to climate change impacts can be better captured as coping, survivalist strategies rather than adaptation. For example, whereas pastoralism as a livelihood strategy is in part the result of climate variability, there is evidence from this volume (cf. Bronkhorst and Schilling et al.) that local communities are finding it increasingly difficult to adapt or mitigate not only to climate variability but also to various structural factors (such as land tenure and a decline of traditional authority) that increase vulnerability.

Moreover, Nabwowe and Mncube in this volume argue that ‘once-size-fits-all’ and top-down policies and strategies will be increasingly problematic in managing communal resources, given high levels of variability and granularity in contexts, experiences and climate impacts. The roles of local knowledge, traditional capacities and local institutions in conflict management are paramount, as demonstrated by Bronkhorst in this volume. Equally so is the need for mediation capacity, as demonstrated by Sala et al. in this volume. A greater contextual focus will also secure attention on the prominence of different African regions (e.g., the Sahel), of individual communities and of different livelihood systems (such as pastoralism or those dependent on forest resources) as considerations in conflict-sensitive adaptation planning. Adaptation by mobile communities (including pastoralists) are clearly important, given the high

levels of vulnerability experienced among these groups and their tenuous rights to resources, especially land.

In terms of research and responses, therefore, conflict-sensitive adaptation should first expand the contextual knowledge base and data, and local narratives about climate change and conflict should be taken into account. In particular there is need for a greater cognisance of the complexities, variabilities, vulnerabilities and stakeholders in different contexts. Second, local-level capacity and resilience building should be centralised to develop local competence and skills (including strengthening local and traditional capacities for resilience building and conflict prevention), appropriate technology development, identifying and empowering vulnerable groups, and so on.

Climate resilience-building activities already illustrate a cognisance of the importance of the community (cf. Ashwill et al. 2011), and community-based natural resources management enhances resilience to climate change (Tompkins & Adger 2004) but conflict-sensitivity does not appear to be a major focus. That said, Saferworld – through its focus on the local, on conflict-sensitivity and on the multidisciplinary understanding of climate impacts – initiated a project in Nepal to assist in the development of conflict-sensitive Local Adaptation Plans of Action (LAPA) (ECC Platform 2011). In regards to local adaptation, Stringer et al. (2009) argue that it is essential to assess how household and community level adaptations have been helped or hindered by institutional structures and national policy instruments. They argue that there is need to reflect on efforts related to the UN's environmental conventions to 'ensure that policies support the maintenance of local adaptations and help retain the resilience of socio-economic and environmental systems' (Stringer et al. 2009: 748).

The Sahel, coasts and oceans

Conflict-sensitive adaptation will be especially critical in areas where there is high dependence on natural resources and in already fragile (politically, socially, economically, environmentally) contexts (Yanda & Bronkhorst 2011). One such area, the Sahel, has also emerged as an area particularly vulnerable and deserving of focus. According to Von Uexkull, 'the Sahel appears to be both very vulnerable to the physical effects of climate variability and to see a certain type of organised violence [i.e. communal conflicts], the dynamics of which in turn seem to be sensitive to climate variability' (p. 167). As noted earlier, the chapters by Hamro-Drotz, Bronkhorst and Schilling et al. in this volume provide specific focus, highlighting the region's importance for scholars.

While we dedicated two chapters of this volume to coastal and oceanic issues, conceptual clarity and more research is needed in order to analyse the climate-conflict nexus for coasts and oceans. Harrould-Kolieb and Kolieb make a compelling case for the need to include ocean acidification as a central consideration in conflict-sensitive adaptation work. This is especially important given the intersection (from a livelihood perspective, for one) of terrestrial and marine issues in climate change. Moreover, what

is disconcerting, as noted by Ahmed et al., is the relatively limited scope of literature on coastal natural resource management (NRM) considerations.

While measures such as Integrated Coastal Zone Management (ICZM) have improved stakeholder participation and reduced top-down management of resources that have plagued the NRM field, there appears to be little in terms of conflict- and climate-sensitivity that is discernible from existing theoretical and empirical work according to Ahmed et al. As part of strengthening the NRM aspect of adaptation in coastal zones, Harrould-Kolieb and Kolieb call for more work to identify African coastal communities that are at risk of climate-related conflicts, through analysing resource dependence, predicted coastal and ocean changes, and by measuring the adaptive capacity of coastal communities. This has not been done in any great depth, to our knowledge.

Improving the knowledge base is critical for research, policy and practice

Regarding adaptation more broadly, there is limited research in relation to conflict-sensitive adaptation in Africa. Research needs to rigorously present findings to differentiate between adaptation and coping strategies. To conflate the two is likely to result in a superficial examination of why and how people are responding to climate change, and more importantly, the results on how sustainable those responsive strategies are would at best be doubtful.

Local case studies reflecting different contexts and experiences are particularly lacking. It is therefore important that relevant research to unpack context-specific dynamics is undertaken. This is particularly true in those fields where a number of process-oriented skills will be needed by local experts, as described by Sala et al., with reference to mediation strategies and tactics to mediate natural resources issues. The research is also crucial to inform policy formulation, training and strategies. The reliance on external 'experts' should be reduced and local capacity for monitoring climate change and conflicts as well as adaptation strategies adopted should be enhanced. In this regard the importance of traditional, local and indigenous knowledge and bridging the gaps between different types of knowledge should be emphasised.

Another important consideration is knowledge management and dissemination, that is, how do we make science user-friendly at the local level and among groups that need it the most? Chan et al. in this volume highlight the need to blend governmental information systems with local traditional knowledge, and they also promote the integrated application of traditional media (e.g., radio) with advanced information technologies (e.g., crowd-sourcing data gathering techniques) to assess climate-induced impacts in Africa.

Tools and policies for conflict-sensitive adaptation

While it is important to continue to fine-tune theories, gather data and explore the climate-conflict nexus in Africa, there seems to be ample reason to build on existing practice and policy to achieve conflict-sensitive climate change adaptation. A number of think tanks and NGOs have taken up the cause with a clear focus on the multidisciplinary intersection of development, peacebuilding and adaptation work. According to Yanda and Bronkhorst (2011), technical aspects of adaptation (such as the building of dams or distributing drought-resistant seeds) are not sufficient to address the complex, multi-disciplinary challenge of climate change. The authors recommend multi-disciplinary policies and projects that will build ‘comprehensive resilience’ against climate change. In the same vein, Smith and Vivekananda (2007: 4) argue that while adaptation should be conflict-sensitive, work in peacebuilding and development should be climate-sensitive, arguing that ‘peacebuilding and adaptation are effectively the same kind of activity, involving the same kinds of methods of dialogue and social engagement, requiring from governments the same values of inclusivity and transparency’. In light of this, what are key lessons for policy and practice, emerging from this Chapter and volume?

Lessons for policy and practice

The need for regional cooperation

While communal conflicts arising from climate change have received prominence in this volume (and we have already demonstrated the need for a greater focus on the local level) a number of cross-border and regional considerations have been alluded to. These include managing migration and displacement that result from climate changes and natural disasters, managing pastoralism in the Sahel (which is not confined within national boundaries) and managing water resources locally and those transboundary resources such as the Nile.

Cross-border and regional cooperation in research, policy making and interventions form an important part of conflict-sensitive adaptation, as underlined by Sala et al. in this volume. Part of this will include the need for dynamic and tailored tools for conflict analysis and resolution. In this volume Tänzler and Rüttinger discuss in some depth the different types of conflicts over water in Africa, before presenting an analytical tool, the Water, Climate Change, and Crisis Assessment Framework (WACCAF) that is focused on conflict potential arising from competition over water between user and/or management groups in the water sector. Sala et al. present existing conflict-resolution mechanisms available at the policy level in Africa, and explore the potential of mediation tools and techniques (as well as the challenges associated with their application) to build the next generation of international agreements and future climate adaptation plans.

Human rights in adaptation research, policy and programming

Adaptation planning should include analyses of how adaptation interventions could undermine livelihoods and sustainability. In this Chapter we therefore have argued that conflict-sensitivity in adaptation is also concerned with the potential conflicting impacts of adaptation programmes on vulnerable communities and people, which includes women. Mohammed-Katerere in this volume makes a strong case for using human rights perspectives in adaptation programme design in order to prevent and resolve conflicts. She argues that human rights approaches to adaptation programme design can yield valuable results by ensuring *inter alia* justice, equity, collaboration, inclusion, social learning and innovation and can enhance livelihood security.

Cooperation, corporates and governance

Conflict-sensitive adaptation to climate change will require cooperation across sectors and scales, and public and private sector players including NGOs, civil society organisations, donor agencies, corporates as well as government departments. In terms of corporations, Kolieb & Harrould-Kolieb in this volume argue that corporate engagement in building climate-sensitive peace can yield important benefits, especially given the corporate potential for innovation, reach and financing. They argue that if corporates themselves do not engage voluntarily in adaptation processes, improved regulatory and legal measures can help make (hitherto) theoretical contributions a reality.

In terms of government, it is imperative that conflict-sensitivity and climate change are integrated as key strategic issues in all government departments, especially in terms of informing responses and the development of appropriate policies. Stakeholders need to work together with local communities to develop approaches to ensure that negative impacts on local conflicts and security are minimised as well as opportunities to create peace and stability are maximised. The latter is also a key characteristic of contexts in which intervention and adaptation strategies are likely to be successful.

Regarding governance, this volume highlights that governance is a key variable influencing how vulnerable nations and communities are to the impacts of climate change. This was demonstrated by the earlier discussion on Darfur (De Waal 2007) and by the findings of Bell and Keys in this volume. For instance, the authors find that the success of food imports (which include food aid), in preventing drought-related conflicts is highly dependent on the ability of the state to distribute food. Therefore in the weakest states local food production may be a more effective preventative measure. This is a critical finding for conflict-sensitive adaptation that requires further research.

A key gap in the climate change literature is the interface between research and policy. This concern is linked to ensuring that information can lead to action on the ground to positively empower communities to respond to and manage negative impacts. Some

additional aspects to be considered in relation to policies and tools for conflict-sensitive climate change adaptation include:

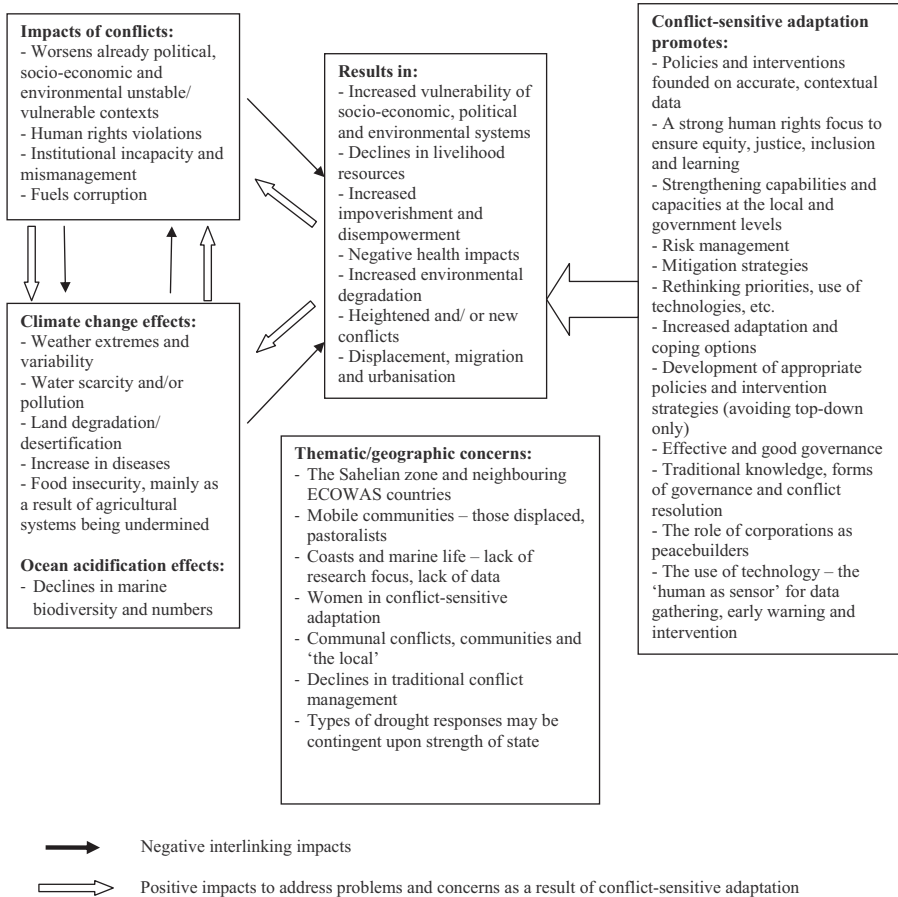
- Conflict prevention frameworks
- Mediation tools for policymakers (as per Sala et al. in this volume)
- Use of technology to prevent and mitigate conflict (as per Chan et al. in this volume)
- Adaptation policy on drought (as per Bell & Keys, and Von Uexkull in this volume)
- Water-related policies tools (as per Tänzler & Rüttinger in this volume)
- Migration and mobility (especially transboundary issues)
- Governance issues (especially in areas with high levels of corruption and poor governance)

It is also important to mainstream conflict-sensitive adaptation in existing policies and strategies such as land and agricultural policies. This requires policies to be reviewed from a conflict-sensitive and climate change perspective. As indicated earlier, it is imperative that policies are sensitive to context specific socio-economic, political and environmental dynamics. Additionally, spaces for policy engagement and action need to be broadened to encourage participation. Policy formulation must also consider mechanisms to translate policy into practice since there are often laudable policies but these are difficult to operationalise. At the same time, adequate monitoring systems to assess maladaptation practices across the different fields (i.e. ecology, agriculture, water management, etc.) will be needed, as well as appropriate knowledge sharing systems to strengthen the linkages among the stakeholders impacted by mitigation and/or adaptation policies.

Conclusion

Figure 1 below summarises the key aspects of the interrelationships between conflict and climate change, drawing particularly from experiences from Africa as discussed in this Chapter and the volume. The arrows indicate the potential for positive feedback if appropriate conflict-sensitive adaptation policies and strategies are integrated as well as the negative influences that conflicts can have on climate change impacts and vice versa, which contribute collectively to increasing human and environmental vulnerability. The figure also presents considerations for conflict-sensitive adaptation that have emerged from this Chapter and volume.

Figure 1: Interrelationships between conflict, climate change and conflict-sensitive adaptation



This volume confirms that climate change impacts need to be mitigated, while adaptation and coping capacity of those most vulnerable and most dependent on natural resources need to be strengthened. This work will be crucial in order to avoid the climate change impacts on livelihoods, mortality rates, and conflicts. The abilities of governments and communities to adapt to climate change and variability depend considerably on the level of development, access to resources (both human and environmental), knowledge, and technical capacity. To enhance conflict-sensitive adaptive capacity at the local level it is critical to develop appropriate policies and intervention strategies that are not only founded upon rigorous research but also responsive to context-specific dynamics and concerns. However, research and policies themselves are unlikely to address the myriad factors and impacts that relate to the conflict-climate change nexus

as elaborated in this Chapter and volume. Political will and the allocation of resources are central to ensure that data and knowledge translates into good policy and practice, and that (good) policy in turn translates into good practice. Crucially, socio-economic and environmental inequalities that often trigger conflicts and reduce adaptive capacity need to be addressed. Of importance will be the need to embrace a rights-based approach, as advocated by Mohamed-Katerere in this volume.

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Human rights: An opportunity for making adaptation conflict-sensitive

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Abstract

This Chapter argues that a strong human rights perspective in adaptation – given its redistributive character – can help Africa reduce the risk of conflicts from policy responses to climate change. The risk is that adaptation by redistributing benefits, costs and opportunities can amplify inequity and scarcity, pit one user against another, and threaten social alliances and coherence. This could worsen the negative socio-economic impacts of climate change and further reduce coping capacity and resilience. For fragile and other conflict-prone societies, including post-conflict nations, this may increase the possibility of conflicts at inter- and intra-country levels. Drawing on lessons from environment-related conflicts, natural resource management and adaptation, the value of human rights in preventing and resolving conflict is demonstrated. Human rights tools and processes are found to encourage equity, greater fairness and justice in decision-making; contribute to building a shared understanding of appropriate actions and priorities among diverse actors; promote collaboration, inclusion and dialogue; facilitate the integration of adaptation, development and human wellbeing; support the social learning and innovation needed for effective climate change response; and enhance livelihood security (food, water, energy). Consequently, incorporating human rights into adaptation policy and practice supports the fundamental transition needed in governance and social relations to build resilient and secure societies.

Keywords: conflict-sensitive adaptation, human rights, livelihood security, vulnerability, inequity, collaboration, social learning

Adaptation runs the risk of conflict

Adaptation seeks to reduce the vulnerability of human systems to the adverse effects of climate change. Whether it does this in ways that strengthen overall resilience – i. e., societies' ability to navigate these new levels of environmental change, uncertainty and risk associated with climate change while maintaining internal coherence – rather than degenerate into conflict depends largely on how adaptation strategies (re)distribute benefits, costs and opportunities among and within societies.

Conflict is used here to describe a state in which two or more actors (individuals, communities or states) pursue goals, objectives or interests that are incompatible or perceived as such (Wallenstein 2007: 16). It includes disputes around entitlements, priorities and values that reduce the effectiveness of governance and human security but do not necessarily entail violence or violent situations in which lives are lost or properties (including homes, agricultural fields and livestock) are destroyed.

Conflict is debilitating for both communities and governments. It can increase the vulnerability¹ experienced by individuals, households and communities to adverse changes in their social, economic and physical environment including from the loss of livelihood assets (Eriksen & Lind 2005; O'Brien & Leichenko 2000). Livelihood assets, which normally contribute to household resilience, can become liabilities in contexts of conflict as entitlements to resources are contested (Lautze & Raven-Roberts 2006). Conflict also diminishes the capacity of governments to use existing resources effectively for development and to improve well-being particularly of the most vulnerable, collaborate with others in finding solutions, and engage in learning and innovation (Mohamed-Katerere 2009). There is, for example, a direct correlation between violent conflict and the ability to maintain functioning food production systems (Weisman 2006).

Five interlinked stress points in adaptation policy that potentially contribute to conflict stand out. First, adaptation involves making trade-offs between different actors, values and priorities and in how opportunities, costs and benefits are distributed. How these trade-offs are made is critical. For example, when decisions lack legitimacy, newly excluded users may refuse to support the new arrangements and conflict may ensue with decision-makers as well as with those who have entitlements (Eriksen & Lind 2005). Second, the distribution of opportunities, benefits and costs within nations shapes the level and kinds of risks different segments of society are exposed to, their ability to cope with increased resource scarcity, higher land prices, environmental instability and climate unpredictability, and social relationships (Ariel et al. 2011; Eriksen & Lind 2005). Third, weak or disrupted social relations along with reduced availability of environmental resources may strain the capacity of states, social organisations, communities and households to respond effectively and in an innovative manner to the new pressures of climate change and to maintain existing productive systems (Mohamed-Katerere 2009; Sayne 2011). Fourth, where adaptive policy increases relative resource scarcity of livelihood assets, disillusionment with the state's ability to provide and find solutions to problems can increase and this may lead to affected people resorting to extra-legal solutions (Kahl 2007; Mohamed-Katerere 2009; Sayne 2011). Fifth, deepening social differentiation as a result of inequitable adaptation could aggravate unresolved long-term historical conflicts over land and natural resources (Peters 2004).

An added challenge for many African nations is that adaptation choices are being made in already conflict-prone societies. Many conflict triggers including poverty, the lack of opportunity and social mobility, weak democratic institutions, and the inability of governments to provide services and maintain the conditions for production (Jaeger et al. 2007; Urdal & Hoelscher 2009) are significant for Africa. Some 47.5% of Afri-

1 Vulnerability is a product of exposure to hazardous events, sensitivity to them and coping capacity, and is affected by multiple stressors including poverty, ill health, inequity, livelihoods, and adverse social relationships (Jaeger et al. 2007).

cans live in poverty as over a decade (1999 – 2008) of annual growth of 5% (Chen & Ravallion 2012) has distributed benefits inequitably. Further, rapid urbanisation along with weak service capacity has led to cities characterised by growing food insecurity, and housing and water challenges (Frayne et al. 2010; Pelling & Satterthwaite 2007; UN-Habitat 2010). Climate change too can contribute to conflicts, given its adverse livelihood and social impacts (Brown et al. 2008; Smith & Vivekananda 2008). In many countries existing conflicts, such as those in East and West Africa around water sharing between pastoral and agricultural communities (Madzwamuse 2010), increase the likelihood that inequitable or exclusionary policies will drive conflict.

Existing governance frameworks in Africa are poorly equipped to deal with these challenges. In many countries they are characterised by weak participatory governance, fragile systems of accountability, financially competitive government agencies, easily extinguishable rights, and ineffective dispute resolution systems (Madzwamuse 2010; Mohamed-Katerere et al. 2012). For example, weak public engagement often means that the poorest and most vulnerable people are least able to influence adaptation policies and strategies in order to ensure that their livelihoods are not compromised (Madzwamuse 2010; Mohamed-Katerere 2009). In the development and environmental sectors, corruption, special interests and weak governance, including poor human rights implementation, contribute to environmental decline, significant inequity in the distribution of benefits, and vulnerability (International Centre for Human Rights Policy (ICHRP) 2008; Mohamed-Katerere et al. 2012; Murombedzi 2010). This effectively undercuts opportunities for adaptation and development. Further, poor integration of adaptation and development means that synergies between these objectives are not identified (Madzwamuse 2010).

This Chapter considers how human rights can contribute to preventing and resolving conflict in adaptation – by paying careful attention to changing social relationships, by ensuring fairness in the distribution of opportunities, costs and benefits, and by offering a way out of existing bottlenecks that perpetuate poverty, instability and weak development. It emphasises the value of human rights as a lens for re-examining the nature of values and priorities, fairness and justice, and respecting social diversity and equality in adaptation and as a normative platform for action.

The value of human rights

The value of human rights in preventing and resolving conflict lies in their role in addressing problems of discrimination and inequality, inequity, and the abuse of power that contribute to political, social and economic injustices. Human rights are based on the premise that all people are entitled to basic freedoms and dignity irrespective of race, nationality, ethnicity, gender, religion or other status, as provided for in the Universal Declaration on Human Rights (UN 1948). The principles of universality, dem-

ocratic legitimacy, justice, protection against war and abuse, legality, equality, respect and remedy provide a foundation for this.

Human rights include substantive² and procedural³ entitlements and obligations. When implemented effectively, these reduce the risk of abuse of power (Grieber et al. 2009), can improve well-being and social relations and ensure that the environment is used sustainably (Grieber et al. 2009; Nyamu-Musembi & Cornwall 2004). Importantly, human rights create specific obligation on states to respect, protect and fulfil their provisions and on non-state actors to respect them (Campese 2009; UNDP 2000).⁴ Consequently these approaches can, as shown in the following section provide invaluable guidance for the design of conflict-sensitive climate change adaptation policies and practices.

Using human rights to reduce the potential for conflict

Reducing the potential for conflict from adaptation demands developing strategies that reduce the five conflict risks identified above: i) how trade-offs are made; ii) the distribution of opportunities, benefits and costs; iii) disrupted social relations and the reduced capacity of states, social organisations, communities and households; iv) extra-legal problem-solving; and v) deepening long-term historical conflicts over land and natural resources. The incorporation of human rights perspectives into adaptation planning and strategies can help reduce these risks by improving benefits and opportunities for the most vulnerable people, reducing inequity, enhancing fairness, and encouraging problem-solving and learning. Nine interlinked strategies that have cross-cutting benefits in these areas are discussed below.

Make fairer trade-offs

One conflict risk with adaptation is that trade-offs could affect the distribution of opportunities, benefits and costs. This can privilege one group or one set of values over another, as has been the case with land policies in Africa (Peters 2004). How these trade-offs are made is critical in whether they aggravate conflict.

- 2 Substantive rights are entitlements to benefits or services and include rights to life, movement, an adequate standard of living, and health.
- 3 Procedural rights pertain to how societies govern themselves and include the rights of access to information, participation in decision-making, fair process and redress.
- 4 Respecting rights means refraining from interfering with the pursuit or enjoyment of rights. Protecting rights means ensuring that third parties (including businesses and non-governmental organisations) do not interfere with the pursuit or enjoyment of rights. Fulfilling rights means creating enabling environments for the realisation of rights. Rights need to be provided where people cannot provide for themselves, but can be fulfilled progressively inline with available resources (Campese 2009).

Centralised decision-making, particularly where there is a lack of opportunity to participate in democratic structures, can contribute to conflict (Håvard et al. 2001; Unruh 2005). For example, in the conservation sector, the establishment of protected areas and other state-managed areas, including forests and wetlands, has led to loss of livelihoods, forced displacements, declines in human security, and conflict between the state and local communities (Alcorn & Royo 2007; Dore et al. 1999; Duffy 2010; Mohamed-Katerere & Ncube 2001). This normative dominance of conservation values over livelihood and cultural entitlements has often contributed to prolonged conflict between affected communities and state agencies (Dore et al. 1999; Mohamed-Katerere & Ncube 2001). For example, in Kitui in eastern Kenya, following the state's unilateral declaration of a state forest to protect water catchments, agro-pastoralists who had used grazing and water resources continued to do so illicitly. This resulted in conflict not only between government and the affected communities but also among user communities (Eriksen & Lind 2005).

Similarly, with adaptation there is a risk that centrally-determined strategies, including infrastructural development such as dam construction and disaster risk reduction strategies, which relocate and displace populations, could increase local vulnerability. In addition policies, such as interstate basin agreements, that do not physically displace people but which reduce access to environmental resources or undermine local decision-making can have similar effects to forced displacement (Schmidt-Soltau 2005). These have long-term adverse impacts on resilience as a result of the breakdown of social networks, loss of community-held knowledge, and reduced access to livelihood assets (Ariel et al. 2011; Eriksen & Lind 2005; Sayne 2011). Unless such communities are provided with sufficient compensation for the loss of livelihoods assets, they tend to move back to their original homes (Raleigh et al. undated). The resulting increase in resource competition between displaced and host communities may add to existing conflict dynamics, as in Darfur (Huggins 2004), the Karamoja region of Kenya, Tanzania and Uganda (Nori et al. undated), and in the Lake Chad area (Niasse 2005).

Avoiding decisions that place 'central' priorities over and above 'local' ones can help reduce the potential for conflict. Further, as is now recognised in the conservation and development sectors, if conflict is to be avoided, trade-offs should not be imposed, but negotiated (Griber et al. 2009). Using impacts on substantive human rights as a guide to adaptation decision-making can help avoid situations where the vulnerability of some people is increased as discussed below. In addition, decision-making tools that are more consultative and inclusive, including the right to free, prior and informed consent (FPIC) and comprehensive compensation for displacement, can contribute to greater fairness. The right to FPIC is the right of indigenous peoples and local communities to give or withhold consent to proposed measures that affect them and thus ensure that their livelihoods and values are not adversely affected (Griber et al. 2009). It is based on the fundamental rights of indigenous people, including the right to self-determination as provided for in the International Covenants on Civil and Political Rights and on Economic, Social and Cultural Rights, the UN Declaration on the

Rights of Indigenous Peoples (UNDRIP) and the jurisprudence of the African Commission on Human and Peoples' Rights (ACHPR) (Colchester 2010). The ACHPR affirmed the right of the Endorois pastoralists of Kenya to own their customary lands and to FPIC (ACHPR 2003). The UN Declaration on the Right to Development 1993 and opinion of the UN Committee on the Right to Elimination of Racial Climate Discrimination provide the understanding that development choices cannot be used as justification for overriding this right (Colchester 2010).

Facilitate better, more integrated decision-making

When national strategies do not factor in local priorities and realities, undesired negative impacts on human security can occur that lead to conflict (Jaeger et al. 2007). For example, in East Africa (Kenya, Tanzania, Uganda and Ethiopia) water policy frameworks that have prioritised wildlife tourism, horticulture and agriculture because of their significance for economic growth have pushed pastoralists off their land and denied them access to dry season pasture resulting in conflict between different pastoral groups as relative scarcity increases (Alcorn 2010; Wambugu 2009). Identifying opportunities to create better synergies between different economic sectors (water, energy, agriculture etc.) will be essential for effective, conflict-sensitive adaptation.

Using human rights as a threshold for decision-making (ICHRP 2008) could help avoid these negative outcomes by demonstrating the link between the loss of rights, vulnerability, and conflict. Rights-based approaches in environmental management, for example, recognise that decisions should do no harm or derogate from existing rights and, in line with international human rights law, should also make progressive improvements in human rights (Grieber et al. 2009). Safeguards, such as those being developed for Reducing Emissions from Deforestation and Degradation (better known as REDD+), are another example of this approach (Murphy 2011) although often these focus more on maintaining the status quo rather than improving rights.

Taking a human rights approach to decision-making can encourage states to move away from broad-brush assessments of the distribution of benefits and costs to a sharper and more precise understanding of whose rights are affected and where (ICHRP 2008). This can help secure fundamental rights in adaptation by discouraging macro-level approaches and investments that increase local vulnerability. Mapping techniques, such as those used in environmental change-vulnerability assessments (Poverty Mapping 2007) can be used to demonstrate how rights are likely to change as a result of adaptation choices. Mapping provides a spatial representation of how different factors overlap and can be used to show where changes in rights from adaptation overlap with existing vulnerability indicators, such as poverty, and conflict triggers, such as environmental degradation. This can help decision-makers better understand likely impacts of their decisions and strengthen coherence across sectors.

Improve visibility of vulnerable groups

The lack of visibility of many vulnerable groups to policy- and decision-makers underpins their exclusion from decision-making and results in decisions that do not adequately take vulnerability into account. In part, this is linked to inadequate understanding of the links between vulnerability and environmental conditions, as well as the links between rights derogations, inequity and well-being (Jaeger et al. 2007).

While there has been a growing awareness of the importance of involving women, efforts to address the needs of other vulnerable groups including children, the elderly, pastoral people, and indigenous people remain lacking (Buffle & Elasha 2011; Seballos & Polack 2011). Yet this is important because climate change can erode the rights of these groups in ways that are not immediately obvious. For example, children's rights to education may be threatened by insecure livelihoods which require them to spend more time in income generating activities (Seballos & Polack 2011). The overall effect may be to lock young people into a future without prospects which can have long-term implications for vulnerability (Kahl 2007; Urdal & Hoelscher 2009). Ensuring that state and other adaptation actors understand the obligation to respect, protect and fulfil rights, and their indivisibility, especially of vulnerable groups, is an essential to avoid these adverse impacts.

Better understanding and appreciation of the rights of vulnerable groups can help government agencies, in keeping with the state's international obligations, to work towards the progressive realisation of human rights and incorporate those rights in project design. The human rights to equality and non-discrimination provide a starting point for confronting the vulnerability of specific groups by requiring the reprioritisation of spending and capacity building. Specific attention to how inequality affects opportunities realised from the use of natural resources can help improve outcomes for groups previously excluded or discriminated against. In Costa Rica, for example, public and private organisations cooperated to develop a communal intellectual property rights system that promoted effective participation of women and consequently recognised their intellectual property and rights to enjoy the benefits of biodiversity use (Mata & Sasvari 2009).

Other tools including human rights-conflict mapping (as discussed), human rights impact assessments (HRIA)⁵ (NORAD 2001), and environmental security assessments (ESA)⁶ (Foundation for Environmental Security and Sustainability 2005) can help decision-making agencies understand how rights derogations are linked to conflict and vulnerability.

- 5 HRIA are designed to identify, predict, and respond to the likely human rights impacts of development and business initiatives.
- 6 ESA are designed to identify risks that arise from the confluence of environmental, political and societal factor and to evaluate the implications of such risks.

Ensure inclusion by recognising procedural rights

Environmental conflicts often occur when all affected actors are not included in decision-making (Conca & Dabelko 2002). This is because exclusion can result in decisions that are perceived as unfair (as discussed), thus increasing inequity. Often exclusion is the result of weak procedural rights, such as rights of access to information, accountability and transparency, as these rights provide for fair and just governance. Exclusion may also result from different levels of economic and political power. In both these circumstances, adaptation strategies may not be capable of implementation or where implemented may lead to conflict, particularly where rights, livelihoods or development opportunities are affected.

At the local level, weak participatory decision-making has led to conflict when new interventions externalise benefits (e.g., for tourism and natural resource markets) or when there are unresolved historical claims and different perceptions of authority between the state and civil society (Moyo & Tevera 2000; Chiuta 2000). At the interstate level, exclusion may perpetuate conflicts that revolve around the disjuncture between historical and equitable use. For example, those states that have enjoyed historical advantage to a resource being reluctant to give up these benefits in favour of greater equity, as has been the case in ongoing Nile river disputes. These differences may be directly related to increased resource scarcity, population growth or increases in population density, and economic development (Chenje & Johnson 1996). Strengthening collaboration or participation and other procedural rights can help break these deadlocks and lead to greater collaboration and inclusion.

A diverse set of experiences, worldwide and in Africa, including in protected areas in South Africa (Crane et al. 2009), joint management of the Nile Basin (Kameri-Mbote 2005), and in wildlife use in Tanzania (Nelson & Bromley 2010) suggest that participatory or collaborative governance systems increase equity, reduce vulnerability and decrease the likelihood of conflict. In these circumstances, compromise, shared understanding and the resolution of other long-term differences are more likely – thus constituting a fundamental step in environmental peacebuilding (Conca & Dabelko 2002). However, at the interstate level all rights-holders or affected people are seldom included even though this can help ensure that the choice in favour of one segment of the population does not affect the opportunities of others. Bringing other actors in, such as scientists and NGOs, can boost communication and trust-building. For example, bringing non-government actors into the Nile Basin Initiative contributed to sustained dialogue and trust-building as scientific observations were seen as an important reason for collaboration (Conca & Dabelko 2002). Achieving respect for the human rights values of dignity and equality can encourage cooperation.

The equality of negotiating partners is essential for achieving cooperation. For example, when states intervene in support of citizen claims against citizens of other states, local low-level conflicts can make it difficult for communities to find their own solu-

tions (Mohamed-Katerere 2009). This was the case in the Lake Chad area where conflict over title to and use of farming land became militarised (Niasse 2005).

For collaboration or participation to achieve meaningful consensus there needs to be deliberative and inclusive dialogue in which all actors are 'heard'. Without effective communication consensus may be fragile. At the peak of community wildlife management success in Zimbabwe, the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) set aside new wildlife areas that curtailed customary land use rights (without agreeing to compensation for this loss) and relocated some homesteads (Mohamed-Katerere & Ncube 2001). Despite extensive consultation and broad agreement that a CAMPFIRE project would be beneficial to all parties, when the time for implementation arrived, communities objected and violent conflict ensued for many months. An independent investigation found that although there was community support for CAMPFIRE, consensus had not been reached on the fundamental issue of boundaries, in particular as they related to homesteads and agricultural lands (Mohamed-Katerere & Ncube 2001).

Strengthen land and natural resource tenure

Secure tenure⁷ can be a valuable aspect of a conflict-sensitive adaptation policy as it is an essential catalyst in stabilising communities, improving shelter conditions, reducing social exclusion, improving access to services and the general eradication of poverty (Gondo & Komuhendo 2011). Given the centrality of land and natural resource tenure to livelihoods it is a vital component in reducing vulnerability. Tenure is also necessary to secure other human rights, including food security. The recognition of this relationship prompted the UN Committee on World Food Security to adopt global voluntary standards on tenure that encourages greater equity and equality (FAO 2012).

Recognising local communities and indigenous peoples as natural resource rights-holders and strengthening land tenure rights can create new livelihood opportunities, diversify livelihoods and provide much needed resources including income – and thus contributes to less vulnerable, more stable and less conflict-prone societies (Adams & Hulme 2001; Borri-Feyerabend et al. 2004; Nelson 2010). For example, the improved availability of cash from new livelihood activities can help families invest in water-harvesting technologies, farm inputs, and education; in turn this can strengthen overall coping systems. Having savings and other livelihood assets underpins the ability to survive extreme events and recover livelihoods following an environmental disaster (Scoones 1997).

7 Land and natural resource tenure rights have a foundation within human rights law, including traditional land rights (International Labour Organisation Convention 169, and the United Nations International Covenant on Economic, Social and Cultural Rights 1966). Further, UNDRIP provides strong normative guidance on indigenous people rights to their cultures and self-determination.

Access to multiple ecosystems can support diversified livelihoods and reduce the risk of climate-related livelihood crises for people dependent on agriculture. Forest tenure, for example, can contribute to food security through access to grazing and wild foods, including fruits and meat (Nasi 2011). However, the benefits of these resources can only be fully taken into account in adaptation planning when users have secure tenure that allows long-term management and exclusion of others. In the absence of such security these entitlements may be easily extinguished if the state grants concessions to commercial enterprises or implements restrictive policies.

Tenure reform needs to be a priority in much of Africa as current regimes lock people into poverty and vulnerability (Alcorn 2010). Tenure is often discriminatory – along grounds prohibited in human rights law, including on racial, ethnic and gender lines. Indigenous people and other groups who pursue livelihoods inconsistent with the dominant macro-economic ethos are often severely disadvantaged as they are unable to protect their livelihoods (Madzwamuse 2010). Recognising their traditional and cultural rights, including to land, is an important step to ensure that these populations do not become more vulnerable (Bonnet & Hérault 2011). The rights of these groups, along with other informal title-holders, such as land tenants and customary land-users, tend to be difficult to enforce against those with formal rights, such as the state or private land owners (Mitchell 2010; Gondo & Kyomuhendo 2011). Those with informal titles are often severely disadvantaged in the aftermath of floods and in times of conflict as they struggle to regain access once they have lost physical possession (Mitchell 2010). These now ‘landless’ people are often resettled without compensation. Where there is social disruption or family death it might be even more difficult for these people to establish a tie to the land in question. It is important for state agencies to prepare in advance for this likelihood, carefully mapping and recording legally and socially recognised tenure, including tenure layers or overlaps. Where this is not done in advance, then as provided for in the Pinheiro Principles (the UN Principles for Housing and Property Restitution for Refugees and Internally Displaced People, regarding the right of restitution), this should be resolved prior to reconstruction or resettlement to avoid conflict (Mitchell 2010).

Secure equity in benefit- and cost-sharing with local communities

International environmental law explicitly recognises the rights of access and benefit sharing in natural resources in, for example, the Convention on Biological Diversity (UN 1993). Although strictly speaking not a human right (as yet), this provision is widely recognised as an important basis for ensuring environmental-social sustainability (Campese et al. 2009).

Conflict between communities, within communities, as well as between communities and national or local elites often occurs around benefit and cost distribution. Weak accountability and the lack of transparency in Cameroon’s Community Forests projects led to multiple conflicts between young and old, traditional lead-

ers and local authorities, and poor people and local elites around the distribution of benefits (Formete & Vermaat 2001). Suspicions about illicit appropriation of benefits led to open hostility. These situations are relatively common where national or local elites are likely to capture benefits, as was the case in much community-based natural resource management (Murombedzi 2010). Skewed power relations often underpin this and reinforce established lines of discrimination and privilege, with women, the elderly, indigenous people and so on being least able to secure benefits. These patterns are often closely related to inequality in education, income, decision-making and access to recourse. There is a similar risk with adaptation. Consequently, developing strategies that create opportunities for these groups to gain equitable access to the benefits of conservation (or adaptation) need to be strengthened (Tougiani et al. 2008).

Strengthening accountability and transparency can reduce the likelihood of conflict about benefit distribution because it provides a safeguard against elite capture (Lebel et al. 2006). These rights oblige authorities to inform citizens of the progress made; consequently they can be sanctioned when they perform poorly or challenged by groups that unjustly bear large involuntary risks or receive less than their fair share of benefits (Lebel et al. 2006). Access to environmental information is essential for these governance rights to gain meaningful effect.

Encourage social learning among all relevant actors

Even where greater fairness is achieved in resource sharing and in decision-making, adaptation is unlikely to be successful unless societies respond more effectively to ecosystem change. With climate change, the changes are likely to be accelerated and have increased elements of uncertainty. Learning in such complex situations is as much about relationships, attitudes and mindsets as it is about 'practical tools'.

Social learning is a collaborative learning process between actors in a network (including communities) to develop new understanding, improve a situation and take collective action (Reed et al. 2010). Social learning can facilitate the sharing of knowledge about environmental change as well as about the social factors relevant to conflict, in particular vulnerability.

While improved access to technology and information can help facilitate learning (and interaction), governance and how different actors relate to each other is critical in determining what knowledge and experience is shared, and how it is used. Participatory decision-making along with other interactive processes can support such learning. In the environmental sector, locally-driven learning processes often identify a diverse, but inter-related set of solutions that include strengthening rights and capacity – effectively bringing in new understanding about managerial and adaptive capacity as well as the links between environmental and social resilience. For example, a participatory assessment of adaptation priorities among smallholders in Kenya identified

diverse interventions that could help bolster their livelihoods, including infrastructural development and governance reforms (Roncoli & Okoba 2011).

Strengthening rights, particularly procedural rights, can help facilitate these socially interactive processes. In addition, recognising the cultural rights of communities (including the use of their traditional knowledge) supports equitable and inclusive engagement (Ibrahim 2011; Odero 2011). Participatory mapping or assessments of underlying causes of conflict could lead to more locally-focused adaptation strategies and support information sharing. Respect for the dignity, values, knowledge and culture of diverse actors including local communities and indigenous people creates a foundation for dialogue, learning, innovation and strategic response. The human rights to dignity and equality, and of indigenous people and local communities, underpin this.

Social learning can help state organisations become more responsive and able to develop strategic approaches to changing environmental and social realities, and thus avoid situations that decline into conflict. With increases in the rate of climate change and uncertainty about its impacts on social dimensions, enhancing and maintaining the responsiveness of institutions is important for conflict-sensitive adaptation. The failure to create opportunities for inter-actor dialogue and learning can be the difference between success and failure in adaptation. For example, when the Government of Mozambique and donors chose an adaptive action (resettlement) for dealing with floods without taking into account local perceptions about risk and the cost of proposed adaptation solutions and local priorities, communities abandoned the newly provided housing on higher ground (Patt & Schroter 2005 in Mohamed-Katerere et al. 2012).

Sustaining collaborative initiatives requires continued learning, dialogue and modification of approaches if conflict is to be avoided. In addition to recognising the right of participation of all relevant parties, systems for demonstrating accountability to constituency and mandate as well as transparency are critical for participants and citizens to be able to evaluate performance (Lebel et al. 2006).

The resolution of conflicts

It is inevitable that adaptation will create conflicts. Resolving these, as well as pre-existing conflicts, is essential to build the peace and security needed for adaptation. In line with the human right to redress, access to dispute resolution through courts as well as other dispute resolution institutions is a key aspect. In addition, as shown here, restoring substantive rights can also help resolve conflicts.

The loss of rights from conservation practices and policies, such as the establishment of protected areas, has been a key factor in environmental conflicts. In many places, such policies have led to displacement, extra-judicial killings, and the destruction of property, including homes and fields (Alcorn 2010; Lowenthal 1981; Mohamed-Katerere & Ncube 2001). Conflict is often manifested as illegal use or physical de-

struction of the resources in question (Dore et al. 1999; Mohamed-Katerere & Ncube 2001). This has long-term adverse impacts on social resilience.

The restoration of historical rights in these circumstances has proven to be effective in resolving such conflicts and improving well-being. For example, the exclusion of local communities from Zimbabwe's state forests during the colonial era led to decades of conflict including repeated re-occupation by affected communities who cut down trees to re-establish their homes and fields (Dore et al. 1999). The development of shared forest governance regimes in the late 1990s and early 2000s, which restored some local entitlements to forest resources, led to the resolution of decades of conflict (Mapedza & Mandondo 2002).

Access to redress can create a way out of conflict between unequal parties and an opportunity for people to hold the state and its agencies to account. For example, the Masai people, who were forcibly expelled from their traditional farmland in western Tanzania, were able to use the courts to stop an American safari tour operator from violating their rights by harassing, beating and subjecting them to extrajudicial arrest when they attempted to access their traditional water sources (Minority Rights 2011 in Alcorn 2010: 6).

Build local robust and effective organisations

Robust and effective local organisations are critical for adaptation. State institutions for resolving conflict, such as courts based in urban centres, are often inaccessible to rural communities. Strengthening and developing robust local organisations can support communities in resolving differences about management and benefit sharing. In addition, such organisations are essential for effective participation in decision-making and social learning processes as well as for sustainable environmental management. The effectiveness of such an organisation is linked to the existence of accessible institutional arrangements, including procedural aspects. In addition, recognising the substantive cultural rights of communities to pursue their own management and decision-making has proved effective in managing competition around diverse, valuable and increasingly scarce resources including water and grasslands (Buffle & Elasha 2011; Huggins 2000; Osamba 2001).

In Sudan, following successful rangeland restoration in Bara Province of North Kordofan state, nomadic tribes from other areas moved into the restored lands (Buffle & Elasha 2011). However, the community who had restored these lands was able to negotiate access with the outsiders. The strength of their local organisation and institutional systems, particularly their traditional normative and governance system, was critical in their ability to come to and maintain the agreement. Local norms included the sharing of water, rangeland and fire amongst all peoples. As a result, the newly settled pastoral community was not excluded from use, but were bound by local rules. The community leaders encouraged the creation of *Nafeer* (or *Nafir*); these are *ad hoc* cooperative

working-groups created to address issues of harvest, disasters and any sudden or unexpected event. To date, there have been no conflicts over resources in the project location and trespassing occurred only occasionally (Buffle & Elasha 2011).

Adaptation success can result in previously abandoned rights being resurrected or the emergence of new claims, which can create conflict (Buffle & Elasha 2011; World Resources Institute (WRI) 2008). Consequently local organisations need to be able to deal with these circumstances. Undertaking comprehensive rights mapping prior to ecosystem restoration can help remove the element of surprise of new claims. In addition, allowing for the early inclusion of existing rights-holders in decisions about benefit distribution, or the prior establishment of processes for resolving these contested rights, can help reduce the impact of conflict (WRI 2008).

Conclusion: Make rights work

As demonstrated above, the entitlements, norms and values encompassed within human rights can help protect all people from the use and abuses of power – legally, politically, socially and economically – that underpin conflict. From an adaptation perspective this is particularly important as human rights can provide a bridge to fairer, more equitable outcomes and better social relations that enhance resilience and reduce the potential for conflict.

Several human rights stand out as important for facilitating a transition to fairer trade-offs, more integrated decision-making, greater equity in benefit sharing, social learning and access to recourse. These include:

- The rights of specific vulnerable people including children, women and indigenous people to equality, to be treated with dignity, and to non-discrimination.
- Governance rights including rights to participation, accountability, transparency and information.
- The right of indigenous people (and local communities) to FPIC.
- The rights of internally displaced people to compensation and return.
- Land and natural resource tenure rights.
- A right to fair and equitable benefit sharing.
- Livelihood rights including the right to water, food security and housing.
- Right to development.
- The right to life and the right to a clean, healthy environment.
- Rights to redress and to access to justice.

But, legal rights are just one aspect of the ‘architecture of entitlements’ (Kelly & Adger 2000: 330). Power and social relations as well as institutional systems are of critical importance. Many African governments recognise human rights, but there is a gap between law and reality on the ground. Poor implementation, lack of capacity, insufficient incorporation of these rights within national law, as well as poor understanding among implementing agencies and rights-holders about the obligations and entitlements they create, undermine their impact (Schwartz 2008; Serra & Tanner 2008).

Strengthening rights-based decision-making, which is based on procedural and substantive rights, is an underlying and crosscutting aspect that can reduce the significance of conflict fault-lines. Taking on a human rights perspective in decision-making encourages a re-evaluation of the adaptation agenda. This has the value of putting people and their vulnerability at the centre of decision-making and is useful in strengthening understandings of the links between adaptation choices and social relations, vulnerability and conflict. One positive outcome of this is a shift away from abstract overviews to a consideration of how specific people, in specific contexts, are affected. In this sense a human rights perspective supports early identification of conflict drivers and encourages conflict-sensitive solutions; improving the use of human rights tools and methodologies, such as human rights mapping and HRIAs, can support this understanding.

In addition, such decision-making can encourage integrated solutions, which are of increasing importance in the context of dwindling resources. Human rights are indivisible and interdependent and cannot be achieved independently of each other (World Conference on Human Rights 1993). This necessitates solutions that are comprehensive, taking account of diverse rights of various actors within the adaptation landscape. Achieving such an integrated approach requires better collaboration among national agencies as well as between states.

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Engaging the corporate sector in climate-sensitive peacebuilding in Africa

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Abstract

Corporations have moral responsibilities, legal obligations and opportunities to assist in the prevention and resolution of armed conflicts occurring in societies where they operate. However, this area of research is under-theorised. This is certainly the case for regions vulnerable to the harsh impacts of global climate change as well as in many so-called ‘resource conflicts’, common in Africa, in which corporations’ exploitation of natural resources often exacerbate and perpetuate vulnerabilities, animosities and violence. This Chapter examines the linkages between climate change, conflict and corporations in the African context, and the notion of ‘climate-sensitive peacebuilding’ (or ‘climate-sensitive conflict transformation’) is introduced. The concept here is defined as an integrated approach to mitigating and adapting to the effects of climate change, and helping prevent and resolve armed conflicts in vulnerable regions. A model for corporate engagement – at each stage and in every aspect of climate-sensitive conflict transformation – is presented. Despite the theoretical potential, the vision of widespread corporate contributions to climate-sensitive peacebuilding remains unrealised, however – due in part to deficient regulation of corporate conduct in conflict-affected areas that fails to encourage or compel such behaviour. The Chapter concludes with a critique of existing international legal and regulatory mechanisms, and suggests some proposals for concerned governments and civil society actors to help unlock the potential for corporate climate-sensitive peacebuilding.

Keywords: peace, conflict, corporation, business, peacebuilding, climate change, adaptation

Introduction

Climate change (and the related phenomenon of ocean acidification – the subject of another Chapter) is predicted to have substantial negative impacts on the human security of many people on the African continent. If realised it will directly and indirectly exacerbate, even trigger, some armed conflicts through its impacts on ecological systems, weather patterns, rainfall and sea-level rise. These climate changes are expected to lead to increased competition over scarce resources, disputes over resource management, and large flows of migrants and foment social tensions that could all trigger conflicts, violence, and even armed conflict (German Advisory Council on Global Change (WBGU) 2008). Yet, this is not necessarily Africa’s destiny. The challenge is to mitigate these impacts and strengthen adaptive and coping capacities at local levels. The capacities of the most vulnerable communities to withstand the twin prob-

lems of climate change and armed conflict can be bolstered with the assistance of the corporate sector.

Paradoxically, the operations and activities of 'Big Business', namely large transnational corporations (TNCs), are often viewed, alongside climate change, as drivers of armed conflict on the African continent. The private sector is often accused (not without foundation) of pursuing profits at the expense of local communities, feeding corruption and inflaming tensions in already weak-governance states, and perpetuating armed conflicts (Ballentine & Nitzschke 2005). All too often, the interests of business and the pursuit of peace do not seem properly aligned. Yet, the traditional orthodoxy that declares that the important tasks of safeguarding peace and security are solely the domain of governments (assisted by civil society and multilateral organisations, such as the UN) needs reconsideration.

The monopoly on the use of force and the provision of collective goods by sovereign states is in decline, supplemented by the rise of non-state actors, such as TNCs (Clapham 2006). In the modern era, business is a pervasive, ever-present social, economic and political force. TNCs are now 'the primary instrumentalities for economic activity' and dominate the international business landscape (Epstein 2007: 220). The UN has estimated that there are over 60 000 TNCs, with over 800 000 foreign affiliates, and supply chains that criss-cross the globe involving millions more suppliers, distributors and service companies (Nelson & Prescott 2005). Stemming from their massive economic power, TNCs' societal influence, especially in developing countries, is formidable.

Responding to climate change and the search for peace and security – be it in Africa or elsewhere – are universal imperatives. The critical question is how to achieve them in the most efficient manner. In many African and developing country contexts, the two phenomena of climate change and conflict are entangled. Collective responses, correctly calibrated, should aim to address both.

This Chapter contends that corporations – in particular, TNCs – have a tremendous, but largely unexploited potential to contribute to peacebuilding *and* climate change adaptation and mitigation initiatives, without sacrificing their *raison d'être*, that is, profit maximisation (Wegner & Mockli 2003). In the first part of this Chapter, we outline a theoretical basis and model for what we term 'corporate climate-sensitive peacebuilding'. The second part addresses the related public-policy issue: what mechanisms and policies are needed to realise the promise of corporate climate-sensitive peacebuilding in practice? In answering that question, ideas for regulatory and policy reform are presented.

Contextualising linkages between climate change, corporations and conflict

Considerable academic research has been conducted, and much popular criticism meted out, detailing the causal linkages between the actions of corporations, climate change and conflict (Ballentine & Nitzschke 2005). This Chapter focuses on the positive side of the ledger, which has received far less attention: theorising the constructive potential for corporate involvement in conflict and climate change responses (Oetzel et al. 2007). Nevertheless, the main issues regarding negative linkages between climate change, conflict and corporations also deserve attention.

Climate change is set (to continue) to have adverse impacts on human security, in particular in the most vulnerable countries – including several African states (Brown et al. 2007). In addition, it is a likely driver of conflict, especially in the poorest, least-developed regions (Gleditsch 2012). Unless managed appropriately, the consequences of climatic and weather shifts may result in a higher incidence of communal tensions and armed conflicts. Sustainable economic growth cannot exceed a society's resource base, and climate change will impinge on the capacity of some of those resources, and deplete others, causing increased resources competition and demands for their equitable management (Dyer 2009; Homer-Dixon et al. 2011).

Incidences of conflict and major impacts of climate change will likely compound each other's severity. Some vulnerable communities with the lowest climate change adaptive-capacity are also conflict-prone and positive feedback loops between the two phenomena will exacerbate human suffering (Smith & Vivekananda 2008) and vulnerabilities. For example, some scholars foresee that as arable land becomes scarcer in the Sahel region due to rainfall variability and decline, mass migrations will ensue, causing strain on finite resources of neighbouring regions, which may flare up into violence and open conflict or exacerbate pre-existing conflicts, further damaging the adaptive-capacity of that region (Brown et al. 2007). Many factors that reduce a community's adaptive capacity to climate change – for example, poverty, weak governance and lack of social cohesion – are also factors that contribute to trigger outbreaks of violent conflict (Leroy 2009).

Some private sector activities also continue to cause climate change, exacerbate community vulnerability and, as argued, are drivers of conflict. It is the emission of massive amounts of carbon dioxide (and other greenhouse gases) into the atmosphere, especially from the burning of fossil fuels, from industrialised societies during the 19th and 20th centuries that is the primary cause of anthropogenic climate change, according to the Intergovernmental Panel on Climate Change (IPCC 2007). The largest emitters continue to be corporations, and it is invariably through the operations of large TNCs in the oil, coal and gas industries that fossil fuels continue to be extracted and burnt.

Poor corporate behaviour affecting conflict-zones includes the funding of one or more of the warring parties, complicity in human rights abuses, encouraging cor-

ruption, trading in conflict-related goods and exploiting governance gaps for profit (Deitelhoff & Wolf 2010). The corporate practices of some transnational extractive companies in Africa are illustrative of private sector activity that diminishes the adaptive capacity of some states, fuelling and exacerbating human insecurity and conflict. For instance, control and commercial exploitation of the lucrative oil fields in the Sudan and Nigeria are contributory factors to the ongoing violence experienced in both countries (Shankelman 2006), and mining companies have helped keep the Democratic Republic of Congo in a cloud of conflict for decades, through their collusion with militia groups, environmental harm, such as deforestation and water contamination, and inequitable use of the country's natural resources (Zimmer 2010).

There are some notable positive contributions corporations have made to conflict management and prevention in Africa. The Kimberley Process Certification Scheme is an example of a partnership between civil society, industry and governments to address the trade in blood diamonds that was being used to fund wars in Angola, Sierra Leone and Liberia (Deitelhoff & Wolf 2010). However, the evidence available suggests that TNCs are reticent to get involved in peacebuilding and developing good governance in zones of conflict, and as a result their potential contribution remains largely untapped (Wegner & Mockli 2003). Arguably, the corporate sector has an ethical obligation to assist those countries and communities whose natural resources have contributed to their profit-margins, including those that suffer from the effects of armed conflict, climate change, or both.

Indeed, in many African contexts, where communities vulnerable to climate change impacts are also prone to conflict, we contend that the private sector is a vital component of effective, climate-sensitive peacebuilding. That is, an integrated approach to mitigating and adapting to the effects of climate change, and helping prevent and resolve armed conflicts in vulnerable regions.

The UN-backed international climate change negotiations include deliberations over such issues as transfer of green technology and compensation to developing countries (Stark et al. 2009). The possibility (and urgency) to integrate peacebuilding initiatives within these ongoing global negotiations is clear. With the reinforcing dynamics of climate change and conflict to be fiercely felt in developing and conflict-prone regions of Africa, peace efforts must become environmentally aware – and, at minimum, be conducted without excessive adverse impacts on the local or global environment. Climate-sensitive peacebuilding (or conflict-sensitive responses to climate change) should be a key policy goal, and help orient external actors' engagement in vulnerable regions of Africa.

Situating business in peace and development theories

Corporations are not only active in conflict-zones but, for better or worse are already involved in several international peace and security issues; it is business that sells arms and equips militaries; it is through the cooperation of the private sector that sanctions regimes and embargoes are effectively implemented; and it is often companies that administer and implement many governments' international aid and development work. There is substantial support found in theories of conflict resolution and economics for the proposition that corporations could be great peace builders. Philosophers such as Kant (1795) posited that trading nations were unlikely to wage war against one another. Modern day economists, such as Hayek (1991) and Sen (2001), suggest that one of the great normative features of the capitalist system is its ability to lift huge numbers of people out of poverty, and develop peaceful societies. The push for sustainable economic development has been explicitly linked to decreasing incidences and intensity of armed conflict (Bannon & Collier 2003; World Bank 2011).

Leading peace theorists have urged practitioners and scholars to view peacebuilding as a whole-of-society effort (Galtung 1996), which will include corporations. Sustainable peace requires the involvement of all sectors of society, and involves not merely the finalisation of peace agreements between leaders, and demobilisation of militias and militaries, but also socio-economic development to heal the rifts and alleviate the tensions and issues that were the drivers of the conflict. Sustainable economic development has long been understood to be a vital component of post-conflict reconstruction and to ensure long-term social stability by creating strong economic disincentives to resort to violence (Bannon & Collier 2003). Moreover, the underlying socio-legal institutions and infrastructure – such as the rule of law and a functioning political system – that are needed for the private sector to thrive and develop are also critical for the creation and maintenance of peaceful societies (World Bank 2011).

Expanding the resources pie – a job for business

Many conflicts revolve around scarcity and competition over resource issues. This is especially true of African conflicts in recent times (Homer-Dixon et al. 2011; Leroy 2009). A way to help resolve many resource-driven conflicts is to manage those resources more efficiently and distribute their benefits more equitably (Bannon & Collier 2003). With climate change set to heighten competition over arable land, water and other natural resources finding innovative solutions to overcome or adapt to scarcity will become vital. Acting within appropriate regulatory constraints, this exercise is most efficiently achieved by employing the private sector. For instance, as part of climate change mitigation and adaptation, humanity must innovate to mitigate and adapt to climate change, and develop new, non-fossil fuel, energy sources for global sustainable development. That innovation will almost inexorably be developed, commercialised and spread by business.

Businesses, in their inherent design, have several attributes that can create ‘shared value’ – shared between the business and society, and can be leveraged to address society-wide problems like climate change and conflict (Nelson & Jenkins 2010). Such characteristics include an ability to expand economic opportunities, financial resources and access to capital, social permeation and reach, technical expertise and a capacity to innovate (Epstein 2007). Businesses are the engines of any economy, and are the foundations of sustainable economic growth. They provide up to 90% of jobs in a society and entrepreneurial opportunities for locals, build human and financial capital, develop physical infrastructures, promote social cohesion, and are the largest sources of revenues for governments (Nelson 2000).

These characteristics allow the private sector to assist in identifying and assessing how issues like climate change will affect a community, educate stakeholders about the problems, and even help develop practical solutions beneficial to the community concerned (Dyer 2009). Moreover, TNCs possess a truly global network, and by virtue of that reach can leverage their involvement in sustainable peacebuilding efforts for great impact.

The business case for climate-sensitive peacebuilding

Corporate social responsibility

Modern understandings of corporate responsibilities have broadened well beyond the traditional conception that a corporation’s obligation begins and ends at maximising value for its owners (Epstein 2007). This is most prolifically embodied in the theory and practice of ‘corporate social responsibility’ (CSR), a largely Western invention that has been adopted by TNCs the world over.

The proposition that a corporation must ensure it has a ‘social licence to operate’ is now accepted wisdom, and involves ensuring that any adverse impacts of a business’ operations on the environment and surrounding communities are minimised (Fort 2007). TNCs have been chastened by high-profile scandals of poor business practices in the past, and are nowadays aware that if they fail to adhere to basic standards of decency and human rights, their social licence may be revoked. Businesses in such a predicament face reputational and financial risks as well as legal and transactional costs that make it difficult to continue business as usual (Deitelhoff & Wolf 2010). Enlightened self-interest, including upholding corporate values and minimising risks to their business, is a valuable motivation for corporations to assume greater responsibilities for climate-change adaptation and peace, and for getting involved in peacebuilding initiatives (Nelson & Prescott 2005).

Peace: a business opportunity

War creates economic opportunities for some sectors, most notably the armaments industry. However, as Nelson (2000) points out, military expenditures amount to just 4%

of global Gross National Product. With the exception of the arms sector, it has been posited that a peaceful, stable society is more conducive to permit businesses to thrive (Fort & Schipani 2004). This claim is supported by empirical research including the annual Ease of Doing Business Reports produced by the World Bank (2011).

There are also opportunity costs related to armed conflict. Destruction of markets and economies means businesses are hampered or lose the possibility to trade entirely. TNCs curtailing operations due to armed conflict happens regularly. For example, Shell has been forced to shut down production due to violence in the Niger Delta in the past, and Western oil companies were compelled to withdraw from Sudan during its civil wars (Zimmer 2010). Further, conflict, or the imminence thereof, acts as a powerful deterrent for most businesses to enter new markets given their risk-aversion (Bray 2003). Additionally, armed conflict often inflicts tremendous damage to the natural and built environments. The agricultural sector, for example, often suffers even long after hostilities have ceased due to the presence of landmines and unexploded ordnance (Messer et al. 1998) and famine is often synonymous with conflict-torn regions.

From a corporate strategy vantage-point, armed conflict can therefore be construed as a massive market failure. However, as every budding entrepreneur knows, failure also presents a prime business opportunity. Rebuilding a society and its institutions of governance after conflict requires large and ongoing investments of human and financial capital in every industry and social sector. Infrastructure needs repairing and modernising, agriculture and manufacturing industries need to be revitalised, and a market economy revived. As Fort and Schipani (2004: 20) have observed: ‘there exists a dialectically-supporting relationship between business and sustainable peace: business needs stability to thrive, peace can be sustained through the relationships that business build’. To this we can add that climate change – a threat to peace and stability – also presents many opportunities for business: opportunities to profit *and* to do good at the same time.

An effective corporate climate-sensitive peacebuilding model that would maximise its chances of acceptance and adoption, should (in addition to highlighting the aforementioned opportunities) harness core competencies of business. In addition, it should not undermine local and foreign governments from meeting their own responsibilities to citizens and society, but corporates should partner with them (Nelson & Prescott 2005). In the following section, we outline such a model.

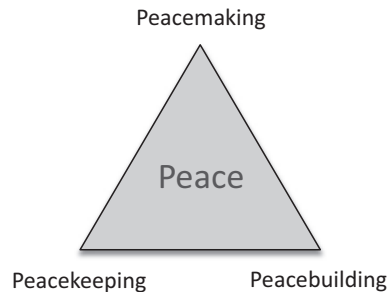
Towards a model of corporate climate-sensitive peacebuilding

Corporate capabilities and attributes suggest they could make contributions in each of the three aspects of the conflict transformation process identified by Galtung (1996)¹ and Ramsbotham et al. (2005), and illustrated in Figure 1:

1 Please note: Generally, the term ‘peacebuilding’ is used throughout the chapter to denote any activities that develop peace, i.e. all conflict transformation efforts. And we often use

- a. **Peacebuilding** – actions aimed at rebuilding and normalising a society’s cohesion, vitality and economy, and reconciling the members of the warring parties.
- b. **Peacekeeping** – actions aimed at ensuring physical security, stability and return of rule of law to conflict zones, epitomised by the presence of UN ‘blue-helmets’.
- c. **Peacemaking** – actions at the political and governance level to settle the dispute, for example, signing of peace agreements.

Figure 1: Representation of Galtung’s tripartite classification of actions needed to achieve genuine, sustainable peace

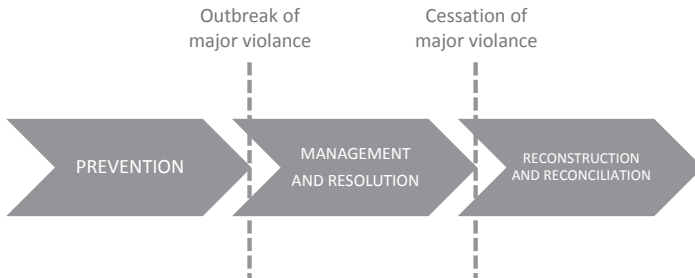


(Source: Galtung 1996; the authors’ representation)

Additionally, TNCs have the potential to make meaningful contributions at every phase along the conflict-to-peace continuum (Ramsbotham et al. 2005), herein labelled: (1) prevention, (2) management and resolution, and (3) reconstruction and reconciliation (Figure 2).

the term ‘conflict transformation’ interchangeably. In this specific section which focuses on elaborating on a model of corporate climate-sensitive peacebuilding, we introduce and utilise Galtung’s tripartite classification of peace activities or efforts, with ‘peacebuilding’ being but one of them, with a more specific meaning.

Figure 2: Simplified conflict-to-peace continuum showing three phases of conflict transformation, before, during and after major hostilities



(Source: Ramsbotham et al. 2005; the authors' representation)

In reality, none of the phases or aspects of conflict transformation are discrete or easily demarcated. However, these theoretical distinctions usefully illustrate that sustainable peace must necessarily go beyond political leaders signing peace accords, to engage all sectors and institutions of society. In addition, the process of developing and sustaining peaceful societies occur along a time continuum commencing well before actual violence, and ending well after hostilities have ended (Oetzel et al. 2007). The typology also serves to highlight that at each stage there are different conflict dynamics, which influence the needs of the societies in conflict. This suggests, as Zartmann (1989) has theorised, that interventions must be calibrated and timed correctly to be most effective. Different possibilities exist for corporate engagement in conflict transformation efforts depending on the conflict phase.

Overlaying the inter-linked issue of climate change to this corporate peacebuilding model results in it becoming a model for corporate sector contributions to climate-sensitive peacebuilding. The model reflects businesses' potential roles in improving Africa's capacity to adapt to climate change and prevent conflict by reducing vulnerabilities and enhancing communities' resilience utilising this framework of climate-sensitive peacebuilding and building upon the ideas of Bais and Hujiser (2005), Fort and Schipani (2004) and Nelson (2000). Table 1 below presents a matrix of possible corporate contributions to climate-sensitive peacebuilding at each stage and in every aspect of the conflict transformation process.

Corporate contributions to climate-sensitive peacebuilding

Social institutions are vital for climate resilience, to ensure peace and sustainable development. Businesses – simply by implementing some basic ethical standards in the workplace and hiring practices – can break down barriers between rival groups, reduce dehumanisation, and dispel stereotypes (Oetzel et al. 2007). Diversity is often encountered in the workplace, and with the appropriate support and leadership from management, racial and other differences can be mediated peaceably (Oetzel et al. 2007).

Similarly, TNCs employing environmentally-friendly, climate-aware business practices would be a useful means for employees and surrounding communities to learn and adopt similar practices. A corporation's ethic will filter out into society – through its operations and its employees. Thus, through their core business practices, TNCs become an important locus for the promotion of human rights and environmental protection in their communities (Nelson 2000). TNCs could proactively seek to reduce carbon emissions and demonstrate the path towards a viable, low-carbon economy. As well as leading by example, TNCs could leverage their influence through supply-chains to encourage a transition to greener, more sustainable business practices.

Corporations' impact on climate-sensitive peacebuilding could go beyond 'internal' sustainability efforts, to encouraging, funding and developing initiatives 'external' to the TNC itself which enhances the adaptive capacity and resilience of surrounding communities to the potential risks of conflict and climate change. Promoting environmental awareness through education programmes and helping to fund a shift to renewable energy sources are two possibilities. Whilst the peacebuilding aspect is where the majority of corporate contributions will occur, we should not discount the important facilitative and capacity-building roles they play in effective peacekeeping and peacemaking.

Corporate contributions to climate-sensitive peacekeeping

Business involvement in the peacekeeping aspect of conflict transformation should not be restricted to facilitating the traditional peacekeeping responsibilities of providing physical security. Businesses have the means and the self-interest to help revive the Rule of Law, and develop or reconstitute a functioning legal system. Moreover, in the prevention and reconstruction phases, corporations have an opportunity to assist in the development of a legal environment that not only prioritises security, but also attracts responsible outside investment and business activity.

The land ownership disputes that contributed to the violence in Darfur are a useful illustration of a possible opening for corporate assistance in a peacekeeping issue (Leroy 2009; de Waal & Flint 2008). According to de Waal and Flint (2008), the region had competing legal systems, and lacked an effective property registration system to protect the rights of property owners. If such a system existed, it is feasible that localised land disputes could have been resolved through peaceful means, thereby mitigating a potential driver of conflict (Fort & Schipani 2004). The ownership and efficient use of arable land will only grow in significance, especially in climate-vulnerable regions, such as the Sahel region of northern Africa, and this may trigger new armed conflicts (Leroy 2009). More broadly, in most societies, an effective system of land registration and property rights is vital to peace and sustainable development. Most TNCs and other businesses seek the stability and security provided by an effective legal system that registers and protects property ownership. Whilst the establishment of legal institutions and laws governing land belong to the domain of sovereign governments

corporations, have a strong incentive to assist relevant government agencies in these efforts. TNCs (and smaller corporations) could contribute capital and expertise to help ensure local governance systems, such as land registers, exist wherever they operate, including conflict-affected and regions vulnerable to climate change.

Corporate contributions to climate-sensitive peacemaking

Undertaking not to engage in corrupt practices and instead aiding the fight against corruption in conflict-affected societies in which they operate (as many TNCs have undertaken to do) is useful in encouraging more effective governance. High-profile voluntary examples are the Extractive Industries Transparency Initiative (2003) and the Publish What You Pay campaign (1999). They seek to garner anti-corruption commitments from TNCs, and to prevent the contribution of conflict-minerals and diamonds that perpetuate conflicts. Despite these types of initiatives, some TNC business practices continue to feed corruption and fraud amongst government officials, especially in developing countries (as documented by Transparency International). Corporations could do far more to assist in the revitalisation of political institutions and good governance. The private sector could assist local governments in developing the regulatory infrastructures that encourage innovation, creativity and business.

Profit-sharing by resource companies is also useful to contemplate. Many large TNCs pay taxes or provide shares of revenue to host governments. Simply providing huge sums of money to corrupt and/or inept regimes increases resentment and wealth disparities and sows the seeds for future conflict. Nevertheless, the potential exists for TNCs to use their capabilities to strengthen local governing institutions. Corporations could supplement their government payments with technical expertise to develop governmental standards and regulations to account, invest and spend those monies efficiently to encourage sustainable development and a 'green' economy.

A more wide-ranging listing of potential corporate interventions – at each stage and in each aspect of climate-sensitive conflict transformation – is provided in the matrix below. Needless to say it is far from exhaustive. Moreover, the applicability of almost all interventions is highly contingent on the unique context and characteristics of any given conflict situation. More theoretical and empirical research is required to determine the criteria and parameters under which corporations should be encouraged to engage in any given peace intervention. Moreover, further research examining the cost and effectiveness of corporate contributions is needed to legitimise the involvement of private corporations in conflict transformation processes of the societies in which they operate.

Table 1: Matrix of corporate contributions to climate-sensitive peacebuilding

		STAGES OF CONFLICT TRANSFORMATION		
		PREVENTION	MANAGEMENT AND RESOLUTION	RECONSTRUCTION AND RECONCILIATION
ASPECTS OF CONFLICT TRANSFORMATION	PEACEMAKING	<p>Adhere to highest responsible business standards</p> <p>Spread standards of accountability and transparency</p> <p>Voluntarily adopt international standards of human rights</p> <p>Support for regional and international conflict prevention mechanisms, and effective governments</p> <p>Support local institutions and UN, African Union, regional organisations and sustainable development NGOs</p> <p>Support initiatives at improving political transparency, anti-corruption and good governance</p>	<p>Assist warring parties' leaderships with open communication channels, and information</p> <p>Facilitate Track 1 diplomacy – secure or support meetings between the parties' leaderships for peace negotiations</p> <p>Facilitate/fund Track 1 5 and Track 2 diplomacy efforts</p> <p>Voluntarily adopt international standards of humanitarian law, and urge adoption by other actors</p>	<p>Facilitate ongoing political dialogues</p> <p>Help develop financial system architecture</p> <p>Promote beneficial economic and political agreements, including economic and development accords between local governments and international organisations and business</p> <p>Support effective and good governance initiatives</p> <p>Promote respect for, and provide support to, representative political institutions</p> <p>Support sustainable regional/city planning</p>
	PEACEBUILDING	<p>Prevent and respond promptly to deleterious impacts of operations on local communities and environment</p> <p>Institute profit-sharing initiatives with local communities, including micro-credit and grant programmes</p> <p>Promote social cohesion directly, and through employment practices and conduct of business</p> <p>Practice climate-sensitive sustainable development, and respect for the environment</p> <p>Assist in developing health, educational, cultural institutions</p> <p>Develop local economies and businesses, through employment practices and sourcing inputs locally</p> <p>Engage in integrated approaches to poverty reduction</p> <p>Invest in physical infrastructure, such as water, energy and transport</p> <p>Support direct community-based climate change mitigation initiatives</p>	<p>Maintain business operations (and income to employees) if safe to do so</p> <p>Utilise natural resources equitably during business operations</p> <p>Ensure operations, facilities and employees are not involved or complicit in abuses</p> <p>Continue 'low-politics' socio-economic development initiatives to directly strengthen community resilience and adaptive capacity</p>	<p>Assist in developing effective socio-political institutions</p> <p>Assist in expansion of local markets for goods and services, and develop strong, sustainable economies</p> <p>Build capacity of local communities towards self-sufficiency and climate change adaptation</p> <p>Share expertise and technical advice to local entrepreneurs and community leaders</p> <p>Invest in youth enterprises and employment and provide micro-credit financing</p> <p>Invest in social reconstruction, including physical infrastructure and climate change responses</p> <p>Assist DDR (Disarmament, Demobilisation and Reintegration) efforts by employing/training former combatants</p>
	PEACEKEEPING	<p>Contribute to early-warning systems to prevent outbreaks of violence by sharing local knowledge and resources</p> <p>Assist in assessment of local communities' climate vulnerabilities</p> <p>Advise international organisations and diplomats of conflict vulnerabilities and issues in local communities</p> <p>Ensure any materiel/services supplied to militaries are not misappropriated</p> <p>Ensure private security contractors employed adhere to the Voluntary Principles and highest ethical standards</p>	<p>Avoid involvement in illegal or unethical activities, such as corruption or bribery</p> <p>Adhere to high ethical standards</p> <p>Adopt the Voluntary Principles on Security and Human Rights</p> <p>Commit to respect International Humanitarian Law</p> <p>Promote security and stability in and around operation and business sites, and for employees and their families</p>	<p>Assist peacekeeping forces with logistics, funding and local knowledge</p> <p>Adhere to the rule of law and high ethical standards, and encourage adherence by others</p> <p>Encourage embedding of CSR and environmental standards in corporate regulation</p> <p>Assist in establishing legal system, including criminal and environmental law, property rights, and effective judiciary</p> <p>Ensure business operations enhance security and stability of local communities</p> <p>Assist in the development of laws and regulations conducive to foreign investment, economic growth and sustainability</p>

Realising corporate contributions to climate-sensitive peacebuilding

To fail to do good when it is in one's legitimate power to do so is rightly condemned by the world.

Sir Geoffrey Chandler,
Chair, Amnesty International's UK Business Group
(Nelson 2000: 6)

Much of the existing academic literature on the topic of corporations and peacebuilding focuses on merely theorising the roles of corporates (Bais & Hujiser 2005; Fort 2007). However, most TNCs have failed to voluntarily embrace their potential for contributing to climate-sensitive peace – this is certainly true in many resource-rich African conflict-affected areas such as Nigeria, the DRC and the Sudans (Bray 2003). In light of this, concerned governments and civil society actors should consider their public policy options. We contend that regulatory reforms, composed chiefly of a mix of inducements and deterrence measures, could be considered (as a first step) that would encourage corporate actors to become vital partners in creating and sustaining peaceful, climate-resilient societies (Nelson & Jenkins 2010).

The final section of this Chapter addresses the question of *how* we can practically realise the vision of corporate climate-sensitive conflict transformation outlined above. The discussion provides a brief critique of some prominent existing regulatory devices that oversee corporate behaviour in conflict-affected areas, and concludes with ideas for possible reform. The focus here is on exploring the regulation of corporate conduct in conflict-vulnerable areas. Developing stable, peaceful societies (especially doing so in an environmentally-aware manner) goes a long way to increase their adaptive capacity to cope with the challenges that climate change may present (Homer-Dixon et al. 2011).

There are increasing efforts amongst governments and NGOs to more effectively regulate corporations operating in conflict-prone and vulnerable regions. The work is, however, dominated by attempts to stamp out poor corporate practices and to hold bad actors accountable, rather than promoting positive peace-building behaviour (cf. Global Witness 2007). Therefore, we assert that government and NGO policies and strategies aimed at addressing armed conflicts and climate change in vulnerable societies in Africa and beyond should include two goals: first, preventing the adverse impacts of corporations on armed conflicts and climate change, and second, encouraging the positive engagement of corporates, even through partnerships.

Fragmented, weak and unenforced: existing regulatory mechanisms for businesses operating in conflict zones

Currently there is no robust 'hard law' legal framework guiding operations of businesses in conflict-affected areas, and no regulatory mechanism compelling a contribu-

tion to peace-building contribution from TNCs (Deitelhoff et al. 2010). Corporations are not directly bound by international human rights and humanitarian law (Clapham 2006). As Ruggie (2011) asserts, states have obligations to protect human rights, corporations should merely try and respect them. In practice, it depends upon national governments (who are parties to the relevant treaties) to secondarily obligate corporations under their jurisdiction or on their territory to abide by them. Similarly, accountability for breaches of other international legal instruments that impact corporate activities vis-à-vis conflict and the environment, for example, International Labour Organisation Conventions and UN-sponsored anti-pollution and anti-corruption conventions are dependent on national governments enforcing their provisions at the domestic level (Clapham 2006) – such enforcement, especially in developing and fragile states, is far from uniform.

The law remains the single best mechanism to deter bad behaviour, but invariably fails to inspire best practice (Epstein 2007). The blunt instrument of legal prosecution, for example under the US' Alien Tort Claims Statute or even at the International Criminal Court (Giannini & Farbstein 2010), may prevent some corporate abuses and bad behaviour, but will not induce positive corporate contributions to the goals of peace and boosting communities' adaptive capacities (French et al. 1992; Nelson & Jenkins 2010). In some countries, national legislation has also been employed to deter certain corporate practices in specific conflict-affected zones. For example, in 2010 'conflict-minerals' legislation was signed into US law. The statute prohibits the use of raw minerals sourced from the DRC and surrounding regions that may be tainted by conflict to be used in electronics products sold in the US.

Some companies and entire industries have adopted corporate codes of conduct and embraced CSR efforts that positively impact their operations in conflict zones (French et al. 1992). Contributions to the welfare of local communities, environmental impact assessments, and anti-bribery commitments tend to form the core principles of these codes, such as the Extractive Industries Transparency Initiative launched in 2002 by UK Prime Minister Tony Blair. However, these codes remain largely voluntary and suffer from ill-developed monitoring and enforcement mechanisms.

International organisations, such as the UN, have also been the source of a proliferation of 'soft law' regulatory efforts at the international level in the last decade (Deitelhoff et al. 2010). The most prominent projects – both UN-backed – are the UN Global Compact – a set of ten basic standards of conduct encompassing protection of environment, labour rights and human rights, championed by then-UN Secretary General Kofi Annan – and the UN's Guiding Principles on Business and Human Rights (2011) drafted by Harvard Professor John Ruggie. The Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, updated in 2011, while not global in membership, are global in reach, well-developed, and also worth mentioning. Champions of the Global Compact and other similar initiatives point to the pace and enthusiasm by which they have been embraced by the international

business community as a mark of their success. For instance, the UN Global Compact has been adopted by over 8 000 corporations hailing from over 130 countries. Critics note, on the other hand, that these corporate governance initiatives are voluntary, usually aspirational in nature, vaguely worded, with self-regulating monitoring and enforcement (Chesterman 2011). From the corporate perspective, the adoption costs are low, and in exchange for a ‘commitment’, a business gets a UN imprimatur to burnish their reputation, whether deserved or otherwise (Williams 2008).

Room for regulatory improvement

There is scope for sharpening the ‘business logic’ for corporate involvement in climate-sensitive conflict transformation. For example, through efforts to end impunity for complicity in war-crimes or crimes against humanity and the environment, and adding to the costs incurred by a business for its contributions to conflicts and climate change through legal sanctions and public naming-and-shaming campaigns. Corporations, especially TNCs, could be better integrated into the international legal order (Clapham 2006). Adherence to international human rights and humanitarian laws could become a minimum, binding standard of corporate conduct. Improving the monitoring, reporting and research of corporate operations in conflict-zones (by NGOs, governments and corporations themselves) is vital to hold bad corporate actors to account, and celebrate best practices.

Apart from increasing the costs of bad corporate behaviour in conflict-affected areas, concerned governments have several policy options available to incentivise the management and owners of TNCs to engage in climate-sensitive peacebuilding. Governments and international organisations could increase funding and financial incentives for responsible investment and businesses operating in conflict-regions or vulnerable societies that demonstrate commitment to peacebuilding. Tax incentives, seed capital, and innovative public-private funding mechanisms such as challenge funds are all tools that have proven successful in the past in attracting the private sector’s interest (Bray 2003). Export credit and insurance agencies could rigorously assess the impact of an applicant’s business on armed conflict and climate change in the countries they operate. These same agencies could put their considerable financial weight behind peace- and environmentally-minded corporations and prioritise the funding of specific projects and companies that promote sustainable peace in fragile or recovering states. Passing conflict and environmental impact assessments could become a prerequisite for TNCs to secure any level of government support. Similar practices have already been adopted by the World Bank, in the UK and the Netherlands to evaluate a project’s human rights impact (Clapham 2006).

Governments (and other concerned NGOs and companies) could leverage their own consumer demands to encourage sustainable peacebuilding practices by its corporate suppliers and contractors. Government procurement, in many developing and developed countries alike, represents significant markets. Forward-leaning govern-

ments could institutionalise contributions to climate-sensitive peacebuilding as a criterion for award of government contracts or tenders to conduct business. At a minimum, government contracts could aim to be ‘conflict-free’, and tender processes could include an investigation of a company’s supply chain and other dealings to ensure it is not involved in excessive environmental harm, carbon emissions or fomenting communal tensions or conflict abroad. Several sovereign wealth funds, including Norway’s, have already adopted an ethical filter in their investment selection process (Council on Ethics 2004).

Governments (and civil society) should commit to regular dialogue with the private sector on matters of conflict, peace and international security. Consulting the private sector in diverse fora such as private policy dialogues and public commissions will allow for information and expertise sharing that may prove useful when planning interventions in vulnerable societies abroad. Dialogue will facilitate businesses gaining an improved understanding of government priorities and strategies when it comes to peace and sustainable development in climate- and conflict-affected regions, and may attenuate their operations accordingly. At the moment, however, there is no single coordination point – at the international level, or at the national level in many countries – between the private sector, government and civil society to maximise the effectiveness of engagements in vulnerable regions. Establishing a standing consultative body between government and the private sector at the national level – with representatives from industry, and industry associations, and relevant government departments – such as defence, foreign affairs and trade – will improve coordination between ministries and with business.

In light of this, serious consideration should be given to the question of what new international institutions might be needed to help facilitate the corporate efforts of companies in contributing to climate-sensitive peace. The UN Security Council established a Working Group in 2004 to examine the role of business in conflict prevention, peacekeeping and post-conflict peacebuilding, with few substantive outcomes to date. The creation of a UN Office of Economic Peacebuilding, a proposal that has been touted for many years but yet to be realised, would be a step towards enhanced cross-sector cooperation (Gerson & Coletta 2002). In an effort to address the often overlapping issue of climate-change adaptation and mitigation, such an Office could coordinate with the UN Environment Programme and other environmental agencies to ensure climate-sensitive approaches to building sustainable peace are adopted.

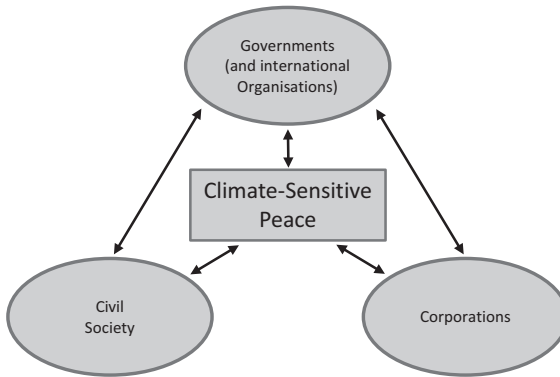
Conclusion: triangulating climate-sensitive peacebuilding

Climate-sensitive peacebuilding or conflict transformation is best envisaged as a society-wide effort, requiring the collaboration of all major social sectors: government,

civil society and the private sector. All three stand to benefit when a sustainable, climate change-resilient peace takes hold.

To date, the private sector has largely been missing from theoretical and strategic responses to climate change and peacebuilding. This Chapter has sought to be a corrective to that. It elaborates on the theoretical contributions that corporations can make to conflict transformation and presents suggestions for regulation and policy reforms that could help make those contributions a reality.

Figure 3: Triangulating climate-sensitive peacebuilding, the three sectors of society working together to create shared value



(Source: Authors)

Of course, none of this is simple or easy. The proposition that corporate contributions to climate-sensitive peacebuilding should be encouraged, even compelled, raises many theoretical and empirical questions deserving of further research that are beyond the scope of this Chapter. But the proliferation of the modern corporations into every corner of the globe, and the political and economic influence that the private sector wields, demands that those concerned with safeguarding peace and security discover methods to encourage corporations to assist in preventing and resolving armed conflicts, and helping vulnerable communities adapt to climate change. Rather than simply criticising large corporations for their role in driving conflicts and climate change, we must seize upon their capacities to contribute to our collective response to these human challenges. In collaboration, government, civil society and the corporate sector make a powerful triumvirate of forces to wage climate-sensitive peace, even in the world's most vulnerable and fragile regions.

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II.

Coasts, oceans and forests

Africa's coasts: Natural resource management and conflict-sensitive adaptation

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Abstract

Conflicts in coastal zones are linked to conflicting interests, concerns, ecological limitations and resource constraints. External pressures or demands have increasingly placed additional burdens on coastal resources and rural poor communities whose options are limited in the face of environmental degradation, declining resources and an increased number of conflicts. This Chapter examines the linkages between poverty and the degradation of coastal environments which are contributing to increased vulnerabilities for both biodiversity and people in coastal areas in Africa. In particular, the relationships between human vulnerabilities and environmental insecurities are explored. The Chapter shows that these relationships are most pronounced in areas where there is high reliance on the natural resource base. The decline of coastal environments and increased poverty are also contributing to conflicts in coastal zones. Thus, conflict-sensitive adaptation and natural resource management (NRM) are critically examined. The Chapter then examines the role of NRM in mitigating conflicts and environmental degradation. The focus is on examining the types of structures prevalent, their effectiveness (especially in relation to conflict resolution) and approaches adopted. Finally, the Chapter forwards suggestions to promote conflict-sensitive adaptation in coastal communities that can benefit both people and nature in the context of NRM.

Keywords: coastal areas, natural resource management (NRM), conflicts, adaptation, Africa

Introduction

Climate change increases vulnerability which is linked to impacts on human lives, livelihoods, poverty, natural resource use, human displacement, and security (Global Humanitarian Forum 2009). In addition, there are several linkages between climate change and resource-based conflicts in coastal contexts (Ahmed 2010; Boko et al. 2007; Hale et al. 1998) which are further explored in this Chapter. Brown et al. (2007) underscore that climate change represents the latest in a series of environmental drivers of human conflict identified in recent decades including drought, desertification, land degradation, failing water supplies, deforestation, fisheries depletion and ozone depletion. They state that climate change is a threat to international peace and security, and the region seen as most likely to suffer its worst effects is Africa.

Several authors put poor communities at the forefront of security concerns from these environmental stress factors because they are exposed more frequently to environmental shocks; and basic services, resources and response mechanisms/adap-

tive capacities are limited (Bob & Bronkhorst 2010; Boko et al. 2007). In addition, in most developing countries the poor often are disproportionately located in rural areas (Mbuli 2008). This is no different in coastal contexts. For example, Francis and Torell (2004) place most of East Africa's coastal communities in rural and marginal areas where dependencies between these communities and natural resources linked to subsistence and informal sector livelihoods are strong. In addition, increasing populations, new ethnic compositions as a result of migration and competition from external actors fuel conflicts associated with access, opportunity and diversification and jurisdiction over coastal and marine resources (Boko et al. 2007; Francis & Torell 2004), including resource degradation. The absence of alternative livelihoods presents the poor with few options to cater for their needs and often results in destructive reciprocal cycles between poverty-generating environmental problems and a lack of livelihood options (Francis & Torell 2004). These large rural populations have the least adaptive capacity and are the most vulnerable to the socio-economic and biophysical impacts of climate change due to their reliance on local resources.

Coastal zone resources provide a range of services and livelihoods for sectors linked to coastal communities, such as fisheries, mining, agriculture and tourism. These are critical climate-sensitive sectors. Additionally, Africa is well-endowed with some of the largest deposits of natural resources in the world, many in coastal areas, such as oil and gas deposits (around the Gulf of Guinea, Sudan and Uganda) to precious metals such as gold, diamond and cobalt (in the DRC, Botswana and South Africa) (Aryeetey et al. 2001). At the heart of conflicts are the issues in the interplay between resource scarcity and/or resource capture by powerful interests (which is explored specifically in a coastal context in this Chapter).

This Chapter will demonstrate that there is a range of NRM structures and strategies at various levels that seek to manage coastal resources. However, several challenges are faced that raise questions pertaining to the effectiveness of current NRM approaches. This Chapter therefore critically examines NRM in coastal areas in Africa in the context of conflict-sensitive adaptation. The next section contextualises the focus of this Chapter in relation to coastal areas in Africa, specifically highlighting vulnerabilities and conflicts. Then conflict-sensitive adaptation and NRM in coastal areas are examined. This is followed by recommendations to enhance effective NRM and conflict-sensitive adaptation.

Coastal areas in Africa: Vulnerabilities and conflicts

Sea-level rise alone, apart from other climate-related impacts, is of great concern to governments (Sterr et al. 2003: 251), especially in relation to national security. In terms of environmental change, the Global Environmental Change and Human Security (GECHS) Science Plan (1999) considers human security as the condition when

and where individuals and communities have the options necessary to end, mitigate, or adapt to risks to their human, environmental, and social rights; have the capacity and freedom to exercise these options; and actively participate in attaining these options. Sonak and Shaw (2006) argue that human security is increasingly becoming accepted as a people-centred concept that focuses on enabling communities to respond to change, either by reducing vulnerability or by challenging the drivers of environmental change. The International Crisis Group (2007 cited in Wijeyaratne 2009: 2–3) identifies three factors affecting vulnerability to climate change:

- The extent to which societies are dependent on natural resources and ecosystem services;
- The extent to which the resources and services that societies do rely on are sensitive to changes in climate; and
- Adaptive capacity – the capacity of societies to adapt to changes in these resources and services.

In terms of coastal communities, many of which are already considered vulnerable to climatic variability, the consequences of climate change are expected to be severe (Monirul & Mizra 2003). In Africa, changes associated with sea level rise, increased storm and flood frequency and accelerated erosion, for example, have been documented along the western, eastern and northern coastlines of the continent (Vordzorgbe 2007). A host of ecological changes (for example, coral bleaching and fluctuations in commercial fish stock) have been experienced along the Red Sea and Indian Ocean zones (Vordzorgbe 2007).

A significant proportion of the coastal populace are poor and highly reliant on threatened coastal resources directly and/or indirectly to survive (UNEP 2006). Coastal zone resources provide important services for coastal communities and underpin key livelihoods of communities through fisheries, mining, agriculture and tourism, which are critical climate-sensitive sectors (Francis & Torell 2004). Moreover, coastal populations are large, comprising some 1.2 billion who live within 100 km of a shoreline and 100 m of sea level (USAID 2007). Most of this coastal population lives in 'relatively densely-populated rural areas and small to medium cities, and a few large tropical cities, where basic services and disaster warning and response mechanisms are limited' (USAID 2007: 4). As a result, biogeophysical changes are expected to have socio-economic impacts such as 'loss of land, infrastructure and coastal resources as well as declines in associated economic, ecological, cultural and subsistence values' (Klein 2002: 11).

The relationship between human vulnerability and hence security and the environment is most pronounced in areas of human dependence on access to natural resources (Shaw 2006 cited in Sonak & Shaw 2006: 2). According to Ahmed (2009), the losses incurred through risks (adverse impacts) in climate-sensitive sectors such as agriculture or fisheries have severe implications for primary sector employment (which char-

acterises much of the workforce in Africa), as well as the second economy (for example, natural resource harvesting and fishing), often unpaid work carried out by women. These risks undermine social and economic security, human development and well-being, and therefore present potential areas for conflict (Ahmed 2009). For example, De Soysa et al. (1999 cited in Bob 2010: 53) state that declining access to resources, or rather to the returns from human uses of natural resources, is viewed as a pivotal process that causes livelihood contradiction and hence increases the risk that people will join armed groups.

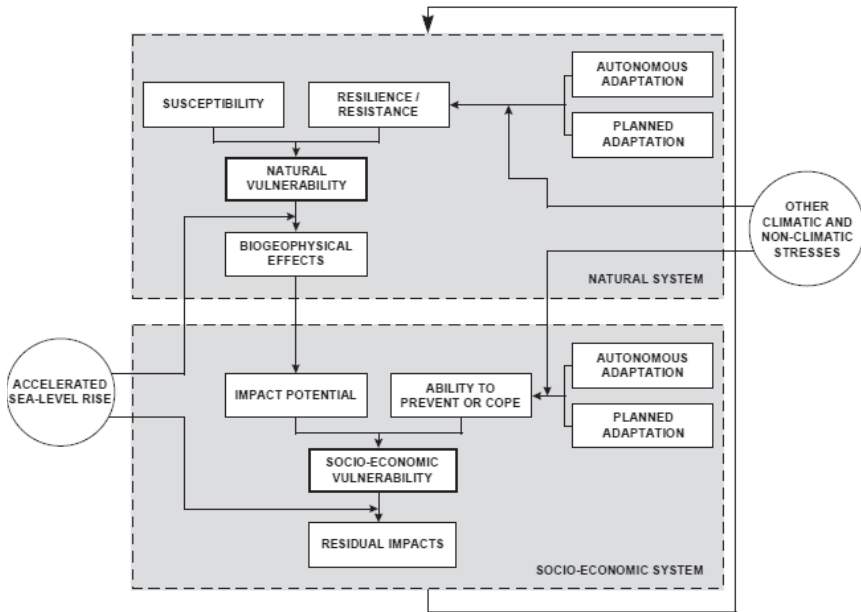
It is increasingly recognised that vulnerability is closely interlinked with gender, and specifically the livelihoods of women who are low-income takers (or less stable earners) in tourism, agriculture and forestry (Simpson & Gössling 2009). This low adaptive economic capacity of women enhances their vulnerability to climate change impacts in the aforementioned sectors. In addition, women in sub-Saharan Africa have a higher prevalence of HIV/AIDS than men, 80% of the 45 million refugees are women and children, women are under-represented in decision-making (including at the household level), present two-thirds of the world's illiterate, are increasingly becoming single household heads and are more exposed to violence (Murray & Stewart 2002). Although research exists with regard to women and the environment, in terms of development impacts, there is a lack of research on gender and resource vulnerability which can result in conflicts (Veuthey & Gerbar 2009 cited in Perry et al. 2010: 122). Perry et al. (2010) highlight that women's situations are often characterised by a lack of control or ownership of, and access to resources (in terms of achieving sustainable livelihoods and food security) – and hence represent the most vulnerable of the vulnerable. In addition, the authors underscore the importance of gender-based violence in environmental conflicts, which increase women's vulnerability significantly.

Coastal vulnerability assessment has received significant international attention in light of actual and predicted climatic changes (Dolan & Walker 2004). Core concepts in contemporary vulnerability assessments comprise the characteristics of 'exposure, susceptibility, and coping capacity, shaped by dynamic historical processes, differential entitlements, political economy, and power relations, rather than as a direct outcome of a perturbation or stress' (Miller et al. 2010: 11). A related concept to vulnerability is resilience. The concept 'resilience' acknowledges the two-way interactions between social systems and ecological systems in contexts of environmental change and uncertainty (Berkes 2010). Following this line of thinking, the resilience approach makes it possible to link, for example, tsunami devastation to coastal clearing for the expansion of shrimp aquaculture for global markets, and the increasing vulnerability of coastal populations to cyclones and storm-surges as well as the 2004 Asian tsunami coastal devastation in Sri Lanka and other countries which was more pronounced due to the loss of mangroves and their buffering capacity (Adger et al. 2005).

Figure 1 shows a conceptual framework for an integrated coastal vulnerability assessment (Sterr et al. 2003: 255). Sterr et al. (2003: 255) state that:

A natural system's vulnerability is a function of the system's susceptibility to biogeophysical effects and its resilience and resistance to these effects. In parallel, socio-economic vulnerability is determined by the impact potential that follows from the natural system and society's technical, institutional, economic and cultural ability to prevent or cope with these impacts. Adaptation, in turn, can help to enhance the natural system's resilience and resistance as well as the socio-economic ability to prevent or cope.

Figure 1: Conceptual framework for a coastal vulnerability assessment



(Source: adapted from Klein and Nicholls 1999 cited in Sterr et al. 2003: 255)

National-level vulnerability indicators for Africa include elements of economy, health and nutrition, education, infrastructure, governance, demography, agriculture, energy and technology (Boko et al. 2007). The authors state that it is 'the interaction of such multiple stress factors, including composition of livelihoods, the role of social safety nets and other social protection measures, that affects vulnerability and adaptive capacity in Africa' (Boko et al. 2007: 443). The lack of adaptive capacity in coastal communities has severe implications for intergenerational access to food, water and other resources (McLean et al. 2001). At the nexus of vulnerabilities within socio-ecological systems are their complex interactions with natural resources, elaborated in a process referred to as 'resource capture and ecological marginalisation' through the work of Homer-Dixon (1999 cited in Ahmed 2010: 32). Evans (2011: 6) extends the complexities discussed by Homer-Dixon to include that the actual risk of conflict posed by cli-

mate change or resource scarcity also depends on the vulnerability of populations, ecosystems, economies and institutions as on the strength of climate or scarcity impacts.

Coastal conflicts take on many forms in Africa. While not as a direct result of climate change, most conflict situations in the coastal zone relate to structural socio-economic deficiencies and/or population pressure (following from the discussion above), which have the potential to escalate under climate change and variability. The main types relate to competition over coastal and marine resources which increases as the resource becomes scarce or depleted (Ahmed 2010; 2011). Ahmed (2010) further indicates that competition and conflict occur in relation to access, use and ownership as well as multiple demands. The following are specific types of coastal conflicts from different parts of Africa: population increases, technological advancements and government control over resources have shifted the use of coastal space and resources increasingly away from resource users to governments and private sector jurisdictions (Hale et al. 1998). The result has been the sectoral management of individual resources like fisheries or industrial and port-related activities. South Africa and other countries on the Atlantic Coast of Africa (Nigeria in particular) have to deal with coastal development, which is resulting from population pressure, industrial development and mineral exploitation, which has resulted in resource degradation (particularly water resources), lost opportunities and intense user conflicts (Hale et al. 1998).

The state of coastal resources is a significant factor affecting livelihood prospects for poor coastal communities (Glavovic & Boonzaier 2007). Cases of exploitation of marine living resources (for example, in the Wild Coast area and south Western Cape areas of South Africa) directly affect the thousands of people involved in subsistence fisheries through loss in income and food security (Glavovic & Boonzaier 2007). In addition, there are no under-utilised or 'new' resources suitable for expanding subsistence fishing opportunities (Branch & Cark 2006). In terms of the poverty-wealth spectrum in the Western Cape, 'much of the coast is now subject to intense pressure for high-end coastal development that may foreclose livelihood options for poor coastal communities' (Glavovic & Boonzaier 2007: 6).

In terms of fisheries sector management, foreign fisheries in the Canary Current and Benguela Current off the west coast of the Southern African region is a contentious issue involving agreements with the EU which resulted in foreign vessels being in conflict with national-based fisheries (Hale et al. 1998). As a result, illegal fishing is rampant and it is estimated that over 40% of the marine fish yield in sub-Saharan Africa is caught by foreign vessels (Hale et al. 1998). Illegal fishing usually involves destructive and unsustainable fishing practices which further degrades the resource. They also undermine fishery-related livelihoods among the poor as resources are reduced or depleted and can result in conflicts between illegal fishing operations and local communities.

Wasteful water use in the tourism sector in certain parts of Africa's coastal areas is contributing to regional water demand conflicts. Tunisia's tourism zones along the

eastern seaboard and the offshore islands, for example, require water to be transferred to some of their best known tourist resort areas, where tourists (per head) consume nine times as much water as nationals, and hence these areas could see water rationing in the near future (UNEP 2005). Iwugo et al. (2003) highlight the case of severe water scarcity in Lagos, as a result of indiscriminate industrial wastewater disposal and sanitation practices in Lagos. The problem of water contamination has regional implications which could impact on other sectors such as tourism, fisheries and health, and has the potential to lead to sectoral conflicts.

In coastal Tanzania and Mozambique, ecotourism activities function as privately owned and managed marine parks. These areas have experienced conflict with local communities as a result of the exclusion of local fishermen from the designated protected areas and where private investments replace local resource utilisation practices (Honey & Krantz 2007). The authors state that the dependence of many coastal livelihoods on open access or common property resources (such as reefs and fisheries) means that changes in legislation and regulations regarding these resources have strong impacts on livelihoods, usually limiting or excluding the poor from use and access to such resources which generally are not subject to recognised property rights or entitlements (increased access and social justice) on the part of local communities.

Conflicts often arise between upstream and downstream users in coastal zones, through the medium of water. Miller et al. (2010) use the concepts of social resilience and ecological resilience to illustrate the point of conflict. They state that powerful interests (for example, agriculturalists upstream) may benefit from the use of water, thus enhancing their social resilience. However, ecological resilience may be compromised downstream by poor water quality as a result of the impacts of agricultural leakage into the water system and poor communities downstream may also have their social resilience undermined as a result (Miller et al. 2010).

Masalu (2000) undertook a survey of coastal and marine resource use conflicts in Tanzania. This is an illustrative example that shows that conflicts arise out of a lack of integrated coastal area management (also highlighted by Ahmed 2011 more than a decade later) in Africa. In particular, Masalu (2000) highlights that in Tanzania conflicts are the result of the sectoral approach to coastal and marine resources management as well as improper or poor implementation of government policies. The study highlighted that local communities, the main stakeholder, are rarely involved in the planning, decision and implementation of many projects. This is also of concern in Africa more generally. Miller et al. (2010) highlight the importance of integrating resilience and vulnerability research in coastal policy contexts, particularly in terms of social transformation. Traditionally resilience (with focus on ecosystems, both terrestrial and marine, and on NRM in key sectors, such as fisheries) and vulnerability research (linking research with policy and practice in key areas such as disaster risk reduction, livelihoods, food insecurity and climate change adaptation) have focused on different policy domains and challenges (Miller et al. 2010). The authors further state

that ‘resilience and vulnerability, as they differentially emphasise ecological-biophysical or social-political dimensions of problems under investigation, offer real opportunities for integration, particularly as they are both oriented toward responses to stress and perturbations, and the interaction of slow and rapid changes’ (Miller et al. 2010: 11). One key aspect relates to social justice and the involvement of local communities in projects.

Wijeyaratne (2009) underscores the relationship between environmental justice and violent conflict, arguing that climate change will have negative impacts particularly on conflict-prone fragile states. Wijeyaratne (2009) further underscores that the necessary pre-requisites for the promotion of peace include tackling environmental injustices (unfair access to land and water which can contribute to poverty, marginalisation and violent conflict) as an integral part of social justice, human rights and women’s rights. Additionally, peace and conflict literature tend to focus on three rationales linking the environment and violent conflict: the distribution of natural resources, competition over natural resources and environmental degradation (Wijeyaratne 2009).

Bunce et al. (2010) show that coastal socio-ecological systems in eastern and southern Africa (specifically in Tanzania, Mozambique and South Africa) are subject to a range of environmental, social and economic changes despite being already vulnerable to these multiple stress factors. Their studies show that policies do not address the problems experienced and often worsen the situation on the ground. In particular, they highlight that policies tend to be context specific and fail to consider the cross-scale dynamics of change, especially in relation to climate. Bunce et al. (2010: 485) specifically argue: ‘This policy misfit may be remedied by a move towards adaptive forms of governance, and necessitates an explicit focus on building adaptive capacity of the poor and most vulnerable in society’.

Ruckstuhl (2009) recommends a better grasp of the potential impacts of conflicts as they strategically inform conflict-sensitive practices. As conflicts over natural resources escalate, four categories of knock-on impacts can be anticipated, enlarging the scope of conflict and further perpetuating the risk of violence (Ruckstuhl 2009: 9):

- Psycho-social (individual) impacts: Perceptions of security change (personal safety, livelihoods and welfare); ‘relative deprivation’; behaviour is adjusted to meet ‘wants’ and ‘needs’;
- Social (intra-group, inter-group) impacts: Social fabric strained; social cleavages emphasised and group identities reinforced; social norms and positions frame interests; benefits accessed and distributed inequitably;
- Political impacts: Environmental norms, positions, and interests permeate the policy domain; environmental issues elevate from ‘low’ to ‘high’ politics; balance of power changes; and

- Economic impacts: Goods production, marketing, demand adjust based on shifts in behavioural norms and socio-political systems; market influence changes.

African coastal areas have a range of pressures and resultant conflicts, as illustrated aptly in the conflict tree for natural resource conflict dynamics developed by the Conservation Development Centre (CDC), International Institute for Sustainable Development and Saferworld (CDC 2009) in the Kenyan context which is relevant for Africa generally. The tree identifies the core problem as natural resource competition and scarcity. The root causes identified are climatic factors which reduce the natural resource base; economic marginalisation and cultural customs linked to weak NRM institutions that result in the depletion of the natural resource base and weak government and security provision, exclusive use of land and ambiguity over land ownership that reduce access to the natural resource base. The overarching effect is increased poverty. The underlying effects are human-wildlife conflicts, loss of biodiversity, land degradation, reduced tourism potential and income, reduced returns from agricultural production, food insecurity, political tensions, insecurities and polarisation of ethnic groups.

The next section briefly examines the importance of conflict-sensitive adaptation. This is followed by an examination of NRM approaches and strategies in coastal areas, specifically engaging in a critique of whether conflict-sensitive adaptation is discernable.

Conflict-sensitive adaptation and NRM in coastal areas

There is limited research on conflict sensitive adaptation and NRM in coastal areas in Africa specifically. Despite this dearth in the literature, key concepts as discussed previously provide the basis to provide signposts for unpacking issues pertaining to conflict-sensitive adaptation and NRM in coastal areas. Prior to looking at conflict-sensitive adaptation strategies, it is important to examine the term 'adaptation'.

Bodin and Crona (2008: 1149) state that adaptation is 'a broad concept informed by both the natural and the social sciences, usually implying a process of adjustment to survive and, ideally, thrive in the face of change'. They assert that in the context of climate change this takes place through adjustments to reduce vulnerability or enhance resilience to observed or anticipated changes. Williams (2011) states that adaptive management is an approach for simultaneously managing and learning about natural resources and therefore adaptation requires access to information, resources and opportunities. This is particularly important in coastal areas where population pressures and climate change stressors have significant impacts along the coast (Ahmed 2010). Furthermore, coastal areas often have context-specific dynamics and climate change impacts. It is therefore important that coastal specific adaptation strategies are considered and implemented. Bodin and Crona (2008) indicate that in Africa a major concern is that the adaptive capacities of populations may not be sufficiently robust to respond to

a rapid increase in climate variability and other stressors. This may be acutely felt in coastal areas given population, developmental and climate changes. Furthermore, in coastal environments UNEP's (2009) warning is of importance, saying that because the way natural resources and the environment are governed has a determining influence on peace and security, these issues can also contribute to a relapse into conflict if they are not properly managed in post-conflict situations.

Berkes (2010: 13) asserts that conventional definitions of 'natural resources' and 'management' are problematic because of their history, and therefore need to be reconceptualised:

The term 'resource' carries a sense of 'free goods', human-centric use and commodification of nature; it can be revised to include the protection of ecosystem services for human well-being. The term 'management' implies domination of nature, efficiency, simplification, and expert-knows-best, command-and-control approaches. It similarly needs a makeover to emphasise stewardship, pluralism, collaboration, partnerships and adaptive governance, balancing efficiency objectives against ecological and social objectives.

This is particularly important in coastal areas where resources are generally commodified and privatised, or are regarded as publicly available, 'free' resources. Thus, there is a dire need to seriously consider effective NRM strategies in coastal areas. The theory and practice of NRM and coastal management was closely associated with the philosophy and tradition in political economy, and largely underscored the separation of humans from the environment, the commodification of nature, the separation of the resource user from the manager and the rise of the managerial class, the evolution of a tradition of positivistic science that assumes that the world is predictable and controllable, and the predominant use of reductionism in science (Berkes 2010). However, changes in this thinking and practice have advanced over the last few decades to the recognition that social and ecological aspects of the coastal management reflect integrated social-ecological systems (Berkes 2010; Millennium Ecosystem Assessment – MEA 2003). Management objectives for coastal resources are increasingly recognising the need to foster healthy coastal communities and healthy ecosystems and ecosystem processes (Glavovic 2006). Instead of entrusting resource decision-making to managers and experts, emphasis is shifting to user participation, public-private partnerships, governance, adaptive capacity and different knowledge systems (Berkes 2010; Glavovic 2006). As indicated earlier, it is also important to centralise conflict-sensitivity.

CDC (2009: 22) states:

Conflict sensitivity is about thinking through the impact of a particular intervention on a conflict context, and then trying to plan and implement programmes in a way that at a minimum does not aggravate the conflict dynamics in that context, and at a maximum contributes to peace or to addressing the causes of conflict.

Wijeyaratne (2009) asserts that conflict-sensitive strategies are founded on unpacking the source and trigger causes of conflict (the what?), stakeholder and affected party

identification (the who?), and determining the political context in which an adaptation programme is being implemented (the where?), and includes measures to promote social tolerance and non-discrimination, empower and include marginalised groups, and ensure fair access to programme benefits (the how?). The author affirms that unless adaptation strategies consider the additional element of conflict-sensitivity, adaptation efforts in conflict-prone and fragile states could unintentionally fuel instability and conflict. In addition, Wijeyaratne (2009: 9) underscores that the central contributions of adaptation efforts are that which can:

... support peace by promoting social justice, human rights, and gender equality by ensuring adaptation efforts are accessible and responsive to both women and men in vulnerable and marginalised communities. Such an approach can help prevent violence and build the conditions for a just and peaceful society. Adaptation, in this sense, could also have a conflict prevention benefit.

Ansorg and Donnelly (2008) specifically state that new adaptation programmes need to include an assessment of conflict risk in order to identify the nature of relationships and power structures within communities, emphasising the importance of centralising the voices of those directly affected by climate-change. Institutions play a key role in defining rules and regulations.

In terms of NRM, Acheson (2006) states that institutions are responsible for making operational rules (rules that constrain or enable individuals' choices or actions) and collective choice rules (rules made collectively by a group that shape collective choices). These rules result in the allocation of rights and responsibilities to different resource users and influence decision-making. Paavola (2007: 100) identifies four institutional rules in relation to NRM:

- Entitlement rules (influence distribution of benefits)
- Exclusion rules (determine unauthorised users)
- Monitoring rules (determine who and what is monitored)
- Decision-making rules (determine who can participate in decision-making and whose concerns are addressed)

The enforcement of NRM rules should contribute to social justice and the sustainable use of natural resources. Thus, the management of coastal resources entails developing a balance between existing resources and use demands. Current NRM governance structures determine the nature, efficiency and distributional consequences of resource management practices and concerns. There is a significant body of literature that examines NRM approaches, mechanisms and strategies in relation to specific contexts, with a few (see for example, Ansorg & Donnelly 2008) including coastal areas. This research reveals that in developing countries and fragile areas, there is limited capacity to cope and deal with the impacts of conflicts and climate change. In this context, it is possible that actions may have the unintended consequence of triggering further vi-

olence and insecurity. Under these circumstances, vulnerabilities increase. Bodin and Crona (2008) indicate that in Africa, vulnerability (specifically poverty, weak governance and political marginalisation) is among the main factors that contribute to conflict. They assert that the link between adaptive capacity and conflict can be viewed in terms of a positive feedback loop whereby a lack of adaptive capacity can contribute to conflict which can in turn undermine adaptive capacity further (see Figure 1). The role of traditional systems in Africa is also important to consider since these are widespread.

Sustainable land use and coastal resource management at the community and household levels cannot be neglected or ignored in areas where high levels of poverty persist and where the re-invention and re-assertion of tradition is prevalent, especially traditional governance structures. Sayne (2009) states that specifically in Nigeria, as social fabrics decay, groups tend to rely more on divisive (ethnically-based) identity politics to sort the haves from the have-nots. Throughout African coastal societies several structures pertaining to NRM exist but the functionality, sustainability and viability of these structures and their ability to address development and environmental needs that impact on the social, economic, political and environmental quality of life are major concerns. NRM in Africa has often been top-down, dominated by state/government or traditional authority interests and controlled by centralised authority in institutional arrangements.

Institutional structures (specifically democratically elected governance structures and traditional authorities) often compete with each other which results in persistent conflicts at the local level. Furthermore, historically, NRM (especially in the context of conservation) structures were perceived by local populations to be an excuse to limit and restrict access to local resources, mainly in coastal areas because of higher biodiversity and economic potential. Local citizens are extremely distrustful of state power and governance structures. As indicated by Sayne (2009), many African government structures at different levels have a reputation for being corrupt with high levels of mismanagement. Thus, governance and leadership concerns are prevalent. This is particularly worrying in the context of climate change which is likely to worsen conditions and place additional burdens on already depleted resources, requiring effective and trustworthy leadership. The state is likely to continue to play a major role in NRM generally and dealing with climate change. It is therefore imperative that governance structures and approaches change to re-align to ensure broad-based and meaningful participation rather than reinforce the top-down approaches that currently characterise governance in Africa. This is the cornerstone of promoting sustainable conflict-sensitive adaptation rather than relying on ad hoc, reactionary responses.

Bodin and Crona (2008) highlight the importance of social capital (institutions and networks at the local level) and leadership characteristics in resource management in a fishing community in Kenya. By undertaking a social network analysis, they illustrate high levels of social capital within the community to manage and monitor resources. However, they also warn that influential persons in power can dominate. Additionally,

they argue that inadequate access to financial resources and markets result in the lack of common initiatives to deal with the over-exploitation of fisheries. Furthermore, they reveal that there is poor recognition of the problem of changing ecological conditions and institutional processes. Their case study shows that while social capital is important for NRM it is not sufficient if people do not understand the nature and extent of the problems experienced and how the depletion of coastal resources can have long-term negative impacts. Thus, relying on existing organisational structures and approaches at the local level to promote conflict-sensitive adaptation can be problematic.

The above discussion reveals that there are challenges in establishing effective management mechanisms or processes for resolving conflicts many parts of Africa (including coastal areas) or avoiding the emergence of new conflicts (Masalu 2000; Sayne 2009). Conflict resolutions, if they do occur, usually rely on commitment of the parties involved to negotiate. As indicated earlier, it is imperative that power dynamics are considered in relation to NRM and conflict resolution processes.

Recommendations

Policy debates addressing climate change highlight two key issues – mitigation and adaptation (Aryeetey et al. 2010). The authors state that for oil producing economies of Africa, mitigation is a long-term challenge, requiring alternate forms of development and as a result, the immediate policy challenge will therefore be adaptation. While context specific adaptation (for example, coastal flooding) will be required, the common factor emerging from research underscores the importance of investing in human and social capital to build resilience to shocks associated with climate change (Aryeetey et al. 2010). Mclean et al. (2001) add that understanding the process of coastal adaptation in the context of climate change and/or climate variability, together with other stress factors which produce actual and potential impacts enable efforts of mitigation, to remove the cause of the impacts, or adaptation to modify the impacts.

Sonak and Shaw (2006: 13) state:

... integrated management and sustainable development of coastal and marine areas is one of the main programme areas identified in Agenda 21 for the marine sector and include the following: preserving ecologically sensitive areas, developing and increasing the potential of marine living resources, ensuring the effective monitoring and enforcement with respect to fishing activities, improving the living standards of coastal communities, maintaining the health of the marine environment and addressing issues of critical uncertainties and climate change.

To this end, many African countries are adopting and implementing integrated coastal zone management (ICZM) programmes and in South Africa, for example, the adoption of ICZM policy has been the result of transition and has involved intense civil society stakeholder participation (Ahmed 2008). Bogardi (2004 cited in Sonak & Shaw

2006: 13) adds that ensuring human security necessitates a paradigm shift in the concept of disaster prevention and suggests that instead of starting with a focus on natural hazards and their quantification, the assessment and ranking of the vulnerability of affected groups should serve as the focal point in defining priorities and intervention outcomes.

The UNDP (2010 cited in Mannke 2010:5) states that ‘adaptive capacity and development are generally regarded as being inversely related to vulnerability – the greater the adaptive capacity or development level, the lower the vulnerability’. This notion of adaptive capacity in climate change discussions is necessary, as climate change is arguably the biggest development challenge of the century. Mannke (2010) observes that key vulnerable groups are often excluded from the decision-making process, foreclosing on their needs and concerns when designing solutions. Better solutions may be reached if participatory processes were an integral part of the process. Both Berkes (2010) and Kumar (2009) commend adaptive governance for being collaborative, encouraging flexible and learning-based issue management across different scales, promoting interactive governance, highlighting property rights and the interaction of institutions at multiple levels. Mannke (2010: 6) states that ‘the key time indicators for determining both vulnerability as well as adaptive capacity are education, health level, knowledge, technology, social and governing institutions, and income level which underline the connection between development and adaptive capacity’.

Stakeholder participation strengthens coastal policies by fostering sharing and collaboration between scientific research, traditional knowledge and community concerns into policies (Sonak & Shaw 2006). Commonly accepted factors in successful collaboration include the following (Kumar 2009: 21–22):

- that all relevant stakeholders are at the table;
- that the participants adopt a problem-solving approach;
- that all participants have equal access to resources and opportunities to participate in discussions;
- that decisions are reached by consensus, meaning a general agreement addressing all interests to some extent, and where the engagement of the issues are based on fairness, equality, openness and responsibility (Daniels & Walker 2001 cited in Kumar 2009: 21); and
- that the relevant agencies are guided by the recommendations of the collaborating group (usually through the complementary use of scientific and traditional knowledge).

Mclean et al. (2001) highlight that since coastal zones are sites where different sectors converge, sometimes over use of the same resource, adaptation options need to be integrated with policies in other areas, including disaster mitigation plans, land-use plans, and watershed resource plans and sustainable development plans in order to avoid a

fragmented approach. Sonak and Shaw (2006) underscore the importance of enabling individuals and communities to respond to change, whether by reducing vulnerability or by challenging the drivers of environmental change. The authors state that human security is a people-centred concept and ICZM plans need to include aspects such as identifying 'vulnerable zones' and addressing economic and livelihood security (including considering alternative means of livelihoods, particularly to the fisher community to reduce pressure on coastal fishing), housing and health, as well as access to credit and banking facilities for marginal coastal communities.

According to Ahmed (2010: 33), ICZM is essentially about conflict resolution, as it 'takes place in a limited coastal space and water, where the amount of useable land and other resources available is limited, and where a plethora of interests converge and interact'. Ruckstuhl (2009: 10) maintains that 'conflict may not be an inherently negative phenomenon, and only becomes a social risk when the context lacks necessary mitigating conditions to enable constructive approaches'. Conflict can have positive manifestations:

... for example, rectifying power imbalances and social injustices, and prompting innovation for addressing modern problems and incentives to find long-term solutions. Development operations can capitalise on these opportunities. While violence begets violence, building institutional and organisational capacity for peaceful cooperation and benefit sharing also perpetuates productive relations, mutual development, and peace.

(Ruckstuhl 2009: 10)

It is important that NRM and conflict-sensitive adaptation be integrated into peacebuilding and conflict prevention processes. Specifically, UNEP (2009: 5) summarises the following recommendations worth recounting for consideration in relation to coastal areas in Africa:

- Develop capacities for early warning and early action
- Improve oversight and protection of natural resources during conflicts
- Address natural resources and the environment as part of the peacemaking and peacekeeping process
- Include natural resources and environmental issues into integrated peacebuilding strategies
- Carefully harness natural resources for economic recovery (thereby promoting sustainable livelihoods)
- Capitalise on the potential for environmental co-operation to contribute to peacebuilding

Glavovic and Boonzaier (2007: 1) correctly advocate for the adoption of the sustainable livelihoods approach (which call for the consideration of environmental/natural, social, physical, institutional and financial resources) to reduce coastal poverty in South

Africa which is applicable for Africa more generally. They assert that this approach complements coastal management approaches and practices by focusing attention on the strategies that poor people use to access coastal resources, mediated by (effective and appropriate) governance institutions and social relations aimed at generating desired sustainable livelihood outcomes. Alternative sustainable livelihood support options are also crucial for resilience and to reduce local communities' reliance on decreasing coastal resources.

Conclusion

Coastal resource management must pay attention to socio-economic demands and contestation facing resource users together with ensuring environmental sustainability. There is a range of pressures evident in coastal areas in Africa and climate change stressors are likely to place additional challenges in areas where socio-economic and historical environmental demands have created vulnerable contexts. The links between human vulnerabilities and environmental insecurities are discernible, particularly in areas in which there is a high reliance on the natural resource base. It is important to consider and invest in alternative livelihoods and service provision to reduce the unsustainable use of dwindling coastal resources and develop resilience among coastal communities. What is clearly required is a critical re-thinking of NRM strategies and the manner in which we have traditionally used coastal resources. Climate change is likely to present us with new and unique challenges that will require us to think innovatively about how we use (including restrictions and control), conserve and manage coastal resources.

In conclusion, this Chapter in exploring NRM challenges in coastal areas in Africa and conflict-sensitive adaptation has built a strong case which demonstrates the often explicit (but also chronic) factors that exacerbate conflict and further disadvantage the already disadvantaged (the poor, and within this, women in particular). What is needed above all (and advocated by Daniels & Walker 2001: 153) is collaboration that stems 'from a moral need to find not just common ground, but a higher ground'. In this regard, the manner in which we make decisions and the NRM strategies we adopt are keys to effectively address conflicts and improve the lives of the poor. As this Chapter reveals, non-existent and inappropriate intervention mechanisms and strategies are the biggest risk to peace and stability as well as environmental sustainability in coastal areas in Africa which are facing threats from natural and socio-economic changes and pressures. The inter-related nature of the problems experienced requires interlinked options and solutions that consider the complex interaction of factors and consequences.

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Marine and coastal resources and conflict in a high-CO₂ world

Ellycia R. Harrould-Kolieb and Jonathan A. Kolieb

Abstract

This Chapter explores the increased risks of conflict in Africa due to the marine impacts of climate change and ocean acidification, including coastal inundation, coral bleaching and food web collapse. Combined, these phenomena threaten coral reefs, fish stocks and the well-being of coastal communities and economies. Coastal and marine resources including fish, shellfish, wood and seaweed contribute significantly to meeting human security needs of millions of people through the provision of important sources of food, livelihoods and coastal protection. This Chapter suggests that climate change and ocean acidification threaten to reduce the abundance and change the distribution of vital marine and coastal resources and thereby undermine human security, increasing the likelihood of conflicts. Boosting the resilience of marine ecosystems by reducing or removing other pressures will be paramount in the ability of coastal communities and economies to adapt to climate change and ocean acidification, and thereby reduce the possibility of conflict erupting. Management of coastal and marine resources should be understood as not only sound sustainable development practice, but also as an effective means of preparing and adapting African communities for climate change and addressing a potential driver of conflict.

Keywords: climate change, ocean acidification, marine resources, coastal resources, conflict, adaptive capacity

Introduction

In the early 1990s, the paradigm of human security emerged as a counterpoint to the traditional state-focused concepts of security whose effectiveness at understanding global vulnerabilities and the true drivers of insecurity were being questioned. The seminal 1994 Human Development Report opened with the statement: ‘the world can never be at peace unless people have security in their daily lives’ (UNDP 1994: 1). In this report, the UNDP suggested that the avenue to peace and security lies not in the development of arms, but in the search for sustainable development and therefore in the attainment of the things that make humans feel secure. The UNDP saw human insecurity as being associated with exclusion from and lack of access to resources and power.

Since the publication of this report, a robust literature has emerged refining the notion of human security and a number of discussions have evolved around which threats constitute threats to human security. Some argue that there should be a narrow defi-

inition focusing on security from violent threats (Krause 2007)¹. While others tend towards a broader definition, such as that proposed by the UNDP, that considers a number of factors as threats to human security (UNDP 1994)². For the purposes of this Chapter, in suggesting that changes in marine and coastal resources stemming from a disrupted climate system act to threaten human security in numerous ways, we will return to the definition of human security as developed by the UNDP (1994). We will consider how changes in marine systems may result in threats to economic, food, health, environmental, political, community and personal securities.

Renewable marine resources – such as fish stocks, coral reefs and mangrove forests – often play a vital role in meeting human needs and contributing to human security through, for example, the provision of sustenance, livelihood and safety (Harada et al. 2002; Moberg & Folke 1999; Pauly et al. 2005). Human security, especially in developing countries, is often directly linked to access to natural resources and changes in the abundance or distribution of such resources can limit access and lead to instability and conflict (Cinner & David 2011; Homer-Dixon et al. 2011). The linkages between conflict and renewable marine and coastal resources are less well developed than their non-renewable or terrestrial counterparts, such as offshore oil and forests (Le Billon 2001; Ross 2006). However, there is evidence that conflicts over marine and coastal resources can and do occur at the local, national and international scale and thus, should be considered more thoroughly in the conflict analysis literature (Ahmed et al. 2006; Crawford & Brown 2008; Heffernan 1981). A changing climate threatens to alter many coastal and marine ecosystems; with likely flow-on effects for the people and communities they support, which may in turn lead to conflict. Broadly, a disrupted climate system is likely to limit people's access to the natural resources that are important providers of human security. Societies that have a lower 'adaptive capacity' – that is the ability to withstand and adapt to such impacts are at risk of conflict, and in extreme cases violent conflict (Barnett & Adger 2007).

This Chapter argues that Africa, due to its high likelihood of climate impacts and its relatively low adaptive capacity (Boko et al. 2007), may be particularly prone to conflicts over changing marine and coastal resources. Thus, through an exploration of the inter-linkages between the possible changes in marine and coastal resources and their implications for human security, this Chapter acts as a primer for identifying African communities that may be vulnerable to conflict.

This Chapter starts with a review of the importance of marine and coastal resources in Africa and then reviews how marine and coastal systems are likely to change (and are currently changing) as a result of atmospheric disturbance, which is followed by a discussion of how economic, food, health, environmental, political, community and

1 As operationalised by Human Security Report Project: www.hsrgroup.org

2 As operationalised by the Human Security Index: www.humansecurityindex.org

personal securities could be undermined by these changing conditions. This Chapter does not attempt to predict sites where conflict may erupt, but rather endeavours to highlight the types of communities, industries and locations where further study may be warranted. What this work does do is present issues for consideration in the context of adapting to major climatic challenges.

Importance of renewable marine and coastal resources in Africa

The 40 000 km that make up Africa's coastline are bordered by the Atlantic and Indian oceans and the Red and Mediterranean seas, and are typified by varied ecosystems associated with abundant biodiversity. Seven of the world's 64 large marine ecosystems can be found off the coast of Africa and include coral reefs, mangrove forests, sand dunes, estuaries, rocky shores, very narrow to extremely wide continental shelves, upwelling zones and deep ocean (UNEP 2008). Goods and services provided by these ecosystems include fish, shellfish, wood, fibre, seaweed, nutrient cycling³, protection from storms and erosion, regulation of water quality, spawning and nursery grounds for marine species, and waste removal (Boisrobert & Viridin 2008; UNEP 2003).

The exclusive economic zones (EEZs) of African countries cover over 13 million square kilometres of ocean (Sea Around Us Project 2010) and are important sources of sustenance and economic revenue. Africa's marine and coastal areas are used for habitation, employment, trade, transport, tourism and recreation. The remainder of this section highlights the value of marine and coastal resources in providing human security needs across Africa. The four sub-sections each address resources or oceanic conditions that are not only of ecological significance but are also important providers of natural resources across numerous African communities and industries.

Coral reefs

Over nine per cent of the world's shallow water coral reefs are found in African waters (Sea Around Us Project 2010) and are present from the north-east coast of South Africa up into the Red Sea along the coasts of Sudan and Egypt (Reefbase n.d.). No true reefs form on the west coast of Africa, however, coral communities do exist along the coasts of Cameroon, Ghana, Cote d'Ivoire, Liberia, Sierra Leone, Senegal and Cape Verde (Reefbase n.d.).

Corals form the most biologically diverse ecosystem on the planet. They provide shelter for a myriad of species including many commercially valuable fish and invertebrate species. These reefs are a major source of sustenance and income for millions of Africans and contribute substantially to GDP of many nations through fisheries and

3 The cycling of nutrients, such as carbon and nitrogen, from the physical environment into living organisms and back again.

tourism. The coral reefs of Tanzania, for example, contain diverse assemblages of fish and support up to 70% of all East African artisanal fisheries (Masalu 2000). The coral reefs of the Red Sea are known to host high levels of biodiversity that support rich fisheries and contribute to local livelihoods and the national tourism industry (Boisrobert & Virdin 2008). Additionally, coral reefs are often associated with seagrass meadows, mangrove forests and other coastal wetlands. These systems together provide nursery areas and important habitats for many species, filter runoff pollutants and protect coastlines from storms and erosion (UNEP 2008).

Mangrove forests

Mangrove forests extend from Somalia to South Africa on the east coast and from Mauritania to Angola on the west (UNEP 2003). The highest areas of concentration are on the coasts of Guinea Bissau, Guinea, Sierra Leone and Nigeria. The Niger Delta is home to the largest mangrove forest in Africa and the third largest in the world (Ukwe et al. 2006).

Mangroves provide multiple ecosystem services to human communities, including as a source of timber, firewood, salt and medicinal products. They also act as important nurseries and feeding grounds for fish and invertebrates, including shrimp, sharks and many fish species (Ukwe et al. 2006). Mangroves are also an integral part of protecting shorelines from erosion and in trapping sediments and nutrients that could otherwise harm coral reefs. The value of the goods and services provided by mangroves is significant; for example, a 2002 study of Egyptian mangroves found that their total economic value ranged from US\$182 000 to US\$1.3 million per year (US\$24 000 to US\$91 000 hectares per year) (Spurgeon 2004).

Fisheries

One of the most financially and biologically productive marine areas in African waters – and the world – is that of the Guinea Current Large Marine Ecosystem (GCLME Project) which covers some 7 600 km of coastline and the EEZs of 16 countries stretching from Guinea Bissau to Angola (GCLME Project 2010). This current system is an area of major coastal upwelling and is extremely biologically productive. This system represents an important reservoir for marine biological diversity, is a substantial provider of economic and food security, and supports some of the richest fishing grounds in the world (Boisrobert & Virdin 2008). Artisanal fisheries depend on the rich biodiversity as a source of income and governments attain revenue from the exploitation of fish populations by large industrial fleets. During the 1990s, fisheries catch in this region ranged between 0.7 and 0.9 million tonnes annually, with between 0.04 and 0.1 million tonnes of this annually exported at a value of US\$43 – US\$173 million (FAO 2003).

The countries whose EEZs extend into highly productive upwelling zones, such as the GCLME and the Benguela Current system are often industrial producers of fish, which can provide large inputs into national economies. In South Africa, a wide range of fisheries contribute approximately US\$400 million, or 1%, to the national GDP (Griffiths et al. 2010) and in Mauritania and Guinea Bissau revenue from the fisheries sector accounts for 25 to 30% of all government budgetary receipts (Boisrobert & Viridin 2008). Large foreign fleets, from as far away as Korea and Japan, are also very active in these fisheries and provide revenue from licensing agreements (UNEP 2008). Unfortunately, much illegal fishing also occurs in these waters stripping governments of their possible revenue and over-exploiting, often poorly managed, fish stocks (FAO 2010). Onshore production facilities (such as the tuna canneries of Ghana, Seychelles and Mauritius) also provide employment for local communities and in Senegal the fisheries sector, including onshore processing, employs around 17% of the active workforce (Boisrobert & Viridin 2008).

As many as 10 million people in Africa are employed by fisheries alone and many coastal communities obtain as much as 70% of their daily animal protein from fish (Boisrobert & Viridin 2008). Artisanal fisheries in particular provide vital protein and play a key social role in many of Africa's coastal communities (Glavovic & Boonazaier 2007; FAO 2010). In 2005, fish exports from the continent were estimated to bring in US\$2.4 billion, exceeding the revenue recorded for any other agricultural commodity (Boisrobert & Viridin 2008). Aquaculture, through the farming of species including fish, seaweed, mussels, oysters, prawns and abalone also contributes substantially to the livelihoods of coastal communities (UNEP 2008; Troell et al. 2006).

Top predators

Marine top predators, including Cape fur seals, white sharks and southern right whales are also found along Africa's coasts in great numbers and are proving to be the basis for growing ecotourism industries (Shannon & Moloney 2011). Substantial development of the marine tourism industry has taken place over the last decade in South Africa where tourists can experience both diving and boat-based experiences with great white sharks along the southern coast and other shark species and dolphins along the eastern coast (Griffiths et al. 2010). Diving with great whites is estimated to be valued at US\$4.2 million annually, while tiger shark diving is valued at US\$1.7 million (Dicken 2010). Tourism attracted by the annual sardine run is relatively new, but holds the potential of becoming an important South African industry, with possibilities of economic involvement by the local indigenous communities (Dicken 2010). Marine ecotourism is considered particularly effective at providing social and economic benefits for poor communities (UNEP 2008). For example, whale watching in South Africa and viewing of nesting turtles in Cape Verde have contributed to job creation, business opportunities and education of the local indigenous population, as well as providing local sources of sustainable income (Myeza et al. 2010; Troëng & Drews 2004).

This review provides a clear overview that marine and coastal resources play an important role in the provision of goods and services to meet African human security needs. The next section will explore how these resources are likely to change as a result of atmospheric disruption resulting from anthropogenic emissions of carbon dioxide and, to a lesser extent, other greenhouse gases.

Marine resources in a high-CO₂ world

There is strong evidence that changes in the atmosphere are due to increased levels of CO₂ and other greenhouse gases are underway and have no analogue in human history (IPCC 2007). The ocean is an important part of the climate system and as a result absorbs considerable amounts of heat and gases from the atmosphere (IPCC 2007). This huge capacity to store CO₂ and heat plays a very important role in buffering both present and long-term changes to the climate; in effect the ocean moderates the rate and severity of climate change. This, however, is changing oceanic conditions, most significantly chemistry and temperature. That can, in turn, change sea level, salinity, circulatory patterns and biogeochemical cycles that can influence the abundance and composition of marine life (Solomon et al. 2007). This section will consider how ocean acidification and climate change, the two major consequences of anthropogenic atmospheric disruption, are likely to change coastal and marine resources.

Ocean acidification

Approximately 30% of CO₂ emissions are absorbed from the atmosphere by the ocean (Sabine et al. 2004), directly altering the chemistry of seawater and making it more acidic (Caldeira & Wickett 2003). On average, the ocean is 30% more acidic than it was prior to the advent of the industrial revolution (Orr et al. 2005) and future changes are predicted to occur at such an increased rate that by the middle of this century the ocean could be more acidic than at any point over the last 20 million years (Turley et al. 2006).

Increasing acidity decreases the availability of carbonate ions – important building blocks in calcium carbonate shells and skeletons – and could result in decreased calcification in species such as corals, mussels and plankton (Ries et al. 2009). Along with calcification, changing ocean chemistry may disrupt important biological and physiological processes, such as reproduction, growth and survival (Kroeker et al. 2010), which will likely have consequences for the health and abundance of marine populations (Turley & Findlay 2009; Munday et al. 2010). Species as varied as fish (Munday et al. 2009), oysters (Gazeau et al. 2007) and squid (Rosa & Seibel 2008) show direct effects from ocean acidification; coral reefs appear to be particularly vulnerable to increasing acidity (Anthony et al. 2011; Hoegh-Guldberg et al. 2007). It is anticipated that future ocean acidification will erode the structural integrity of reefs, in part

because the juvenile growth and recruitment rates may decline (Albright et al. 2008) along with the growth of coralline algae that cements reefs together (Manzello et al. 2008), which will result in smaller, less resilient reefs in the future. The loss of coral reefs could negatively affect many species that depend upon them for vital habitats, including feeding grounds, nurseries and shelter (Hoegh-Guldberg et al. 2007).

Many species of marine plankton create calcium carbonate shells and declines in their populations may be expected as conditions become inhospitable for their growth (McNeill & Matear 2008). This could have cascading effects on marine food webs, with top predators, including salmon, seabirds and whales being affected. If predators are unable to supplement their diets with other food sources, food webs may even collapse entirely. Food webs may also become destabilised as the composition and abundance of populations shift due to negative impacts from increasing acidity, including reduced growth rates and disrupted larval development (Turley & Boot 2010).

The potential for vulnerable species to adapt to these changes is currently unknown, however it is expected, in general, to be low due to the rapid rate and magnitude at which acidification is occurring. There are, however, likely to be some species that benefit from more acidic conditions, either because they benefit directly from increased CO₂ or they are able to out-compete other affected species. These more resilient species may be able to move in and fill the niches vacated by impacted species (Gattuso & Hansson 2011). However, the species that do appear to be less vulnerable or better suited to high-CO₂ conditions, such as algae and seagrasses (Hall-Spencer et al. 2008) will likely be unable to support the same diversity that exists in the ocean today.

There are still many unknowns with regard to the responses of many species and how they will, in turn, impact socio-economic systems (Gattuso et al. 2011). However, it appears that ocean acidification poses a substantial threat to human communities and industries, if unabated (Cooley et al. 2011; Turley & Boot 2010; Brander et al. 2009).

Climate change

Climate change is the result of perturbations in the heat content of the planetary system. Much of the heat added (>80%) to the atmosphere is currently being absorbed by the ocean, which is resulting in increasing water temperatures (IPCC 2007). Warming ocean temperatures can cause a number of changes in oceanic conditions, including sea level rise, increased incidence of storms, as well as alterations in circulation, upwelling zones and water mixing (Solomon et al. 2007). Additionally, warming temperatures and the resultant changing oceanic conditions may alter the spread of invasive and nuisance species, and shift the composition and abundance of communities, as well as the timing of fish and plankton spawning, throwing life cycle events out of sync and disrupting predator-prey relationships (Allison et al. 2009). Predator-prey decoupling may also occur as species shift to higher latitudes or deeper waters in an at-

tempt to find tolerable conditions, such as cooler temperatures (FAO 2010). Changes in the availability of primary producers and smaller prey species may have cascading effects throughout marine food webs that could result in significant shifts in the abundance and distribution of species in specific locations (Barange & Perry 2009).

Sedentary species, such as corals that cannot readily move with shifting temperatures may be subjected to temperatures beyond their tolerable limits. Increasing temperatures are known to increase the likelihood of coral bleaching (Hoegh-Guldberg 1999). Bleaching is a condition in which the corals appear to lose their colour due to a breakdown in the relationship between the coral and its coloured symbiotic algae. The algae are vital as they provide food and energy to the coral and their loss can lead to reduced reproductive capacity, growth, resilience and coral death (Hoegh-Guldberg 1999). Many of the large bleaching events that have occurred over recent decades are likely to be a result of increasing ocean temperatures and within the next 30 to 50 years increasing temperatures could result in the majority of the world's coral reefs suffering severe bleaching events annually or biannually (Donner et al. 2005). This means that corals will have less recovery time between such events and will likely be less resilient to future events and other pressures.

Rising sea levels are also a result of rising temperatures. This is caused by two main processes: 1) inputs from other water reservoirs, such as melting glaciers, ice sheets and ice caps; and 2) thermal expansion, which is caused by the expansion of sea water as it warms (IPCC 2007). Increasing sea levels can be problematic for coastal species due to the loss of habitat. Some coastal species may simply be able to move higher on the shore; however, habitat contraction may occur along some variable landscapes or highly developed coastlines preventing shifts inland and may result in declines in species population numbers (Allison et al. 2009). Some species, such as sea turtles may be particularly vulnerable to habitat loss as they return annually to particular beaches for nesting and the loss of these beaches could be extremely detrimental to these already endangered turtle populations (Fuentes et al. 2010).

As tropical waters continue to warm it is likely that tropical storms will become more intense, with higher wind speeds and heavier rain (Bindoff et al. 2007). Hurricanes, cyclones and typhoons draw energy from warm water, therefore the warmer the surface ocean, the more intense the storms. Coastal ecosystems will be threatened by increases in storm intensity as well as storm surges. These, when coupled with rising sea levels, will be higher and reach further inland.

The impacts of climate change and ocean acidification pose a substantial threat to many marine and coastal resources. It is important to note that while the threats are presented in a rather compartmentalised way there are many ways in which they interact and even compound their impacts on marine and coastal systems in sometimes unexpected ways. In addition, these threats are acting on systems often already under pressure from non-climate related threats, such as overfishing, pollution and unsustainable coastal development. Such systems tend to be less resilient to change and may be

less capable than more pristine systems of withstanding the pressures of ocean acidification and climate change.

Changing oceanic conditions will impact coastal areas through sea level rise, erosion and increases in storm intensity (Nicholls et al. 2007). Additionally, a changing climate is likely to create conditions that result in population shifts, declines or even extinctions of species (Ottersen et al. 2001). These changes in the availability of resources are likely to have repercussions for human communities. The next section will explore how the changes in marine and coastal resources may impact human communities and industries and in turn, undermine human security.

Changing marine and coastal resources and human insecurity

The concept of human security stresses that people should be able to take care of themselves: all people should have the opportunity to meet their most essential needs and to earn their own living. This will set them free and help ensure that they can make a full contribution to development – their own development and that of their communities, their countries and the world.

(UNDP 1994: 4)

The changing availability of marine and coastal resources is likely to undermine the ability of people to take care of themselves directly by limiting access to vital resources, such as those that, as demonstrated, provide food or economic resources (Barnett & Adger 2007). Indirect impacts will also be felt as the administrative capacity and authority of governments is weakened by increasing numbers of people requiring assistance or reduced government revenue and as policies, economies and societies shift in an attempt to adjust to changes in the availability of resources (Homer-Dixon et al. 2011). These threats to human security can come in many forms, but are generally categorised by threats to environmental, health, community, economic, food and political securities (UNDP 1994). This section will address each of these categories and analyse how ocean acidification and climate change may act as threats to human security. It is important to note that each of these categories is interconnected and single impacts can cut across multiple categories, for instance shifting fish populations may impact food security by reducing daily protein intake, economic security by affecting fisheries and community security by affecting community cohesion.

Environmental security

Humans depend on a healthy environment, for example, for the provision of clean water and air and inhabitable and arable land (UNDP 1994). Sea level rise and increased incidences of severe weather events may jeopardise human settlements through increased floods and land recession, damage to coastal infrastructure and in some cases inunda-

tion of coastal areas. The African east coast is particularly vulnerable to flooding due to sea level rise (Boko et al. 2007), as are settlements in the Gulf of Guinea, Senegal, Gambia, and Egypt (UNEP 2003). Sea level rise is already affecting large numbers of people in Africa, such as those in the residential region of Akpakpa, Benin, through flooding and destruction of infrastructure and housing due to coastal erosion (Boko et al. 2007). Around 20% of the population of Africa live in the coastal area from Guinea Bissau to Angola (Ukwe et al. 2006), and by 2025 the 500 km stretch of this region from Accra to the Niger delta is projected to contain some 50 million people living in one unbroken chain of cities (UNEP 2008). This area is projected to be impacted by flooding each year by the 2080s, affecting large numbers of people (IPCC 2007).

The population of North Africa is projected to be one of the largest vulnerable to storm surges globally (Dasgupta et al. 2009). It is estimated that by 2030, 50% of Africans will live in cities; much of this growth will be in slums and other less formal communities in the coastal zone (Stark et al. 2009). Informal settlements tend to have weaker infrastructure and are less resilient to floods, storms and other severe weather events (Glavovic & Boonazaier 2007). Even well planned infrastructure may be ill equipped to withstand future changes as coastal planning tends to rely upon historical, as opposed to projected, estimates of sea level, storm frequency and flood heights.

Economic security

A secure basic income provides economic security. Losses of aquaculture, tourism and coastal industries, such as agriculture, due to sea level rise may not only threaten livelihoods but substantially impact national GDPs. For instance, a one meter rise in sea level along the Kenyan coast could see losses in crops of mangoes, cashew nuts and coconuts that could cost almost US\$500 million (Boko et al. 2007). Significant economic losses could also act to destabilise governments and impact political security.

The loss of natural harbours and coastal infrastructure due to sea level rise and the increased frequency or intensity of storms could make fishing more dangerous or less profitable as infrastructure and equipment is damaged and the number of viable days for fishing decreases (Allison et al. 2009; Akegbejo-Samsons 2008). West African fishing communities have been found in the past to have an over-dependence on fishing and allied activities to provide livelihoods (Ukwe et al. 2006), which means these communities are extremely vulnerable to the fishery-related impacts of climate change.

Fisheries will also become less stable sources of employment as changing ocean conditions cause shifts in the abundance and distribution of fish species (FAO 2010). Traditional fishing grounds may no longer be populated with target species and traditional target species may be deeper or farther away, requiring newer more advanced boats and equipment to catch them. Some communities are already experiencing shifts in target species, most likely attributable to climate change. In False Bay, South Africa, for example, shifting wind and rainfall patterns have changed upwelling patterns re-

sulting in the intrusion of cooler waters and a subsequent decline in warm-water mussels (Griffiths et al. 2010). Shifts in the distribution of pelagic fish and West Coast rock lobsters have also occurred (Griffiths et al. 2010).

Ocean acidification will also have direct and indirect impacts on fisheries that could result in substantial disruptions to marine food webs and commercially important fish populations (Turley & Boot 2010). Shifts in the abundance and distribution of fish stocks may force fishing communities to make greater investments in infrastructure or find alternative livelihood sources. Unfortunately, throughout Africa often few alternatives exist in rural coastal fishing communities (Boisrobert & Virdin 2008).

Food security

Food security is provided by the physical and economic access to food resources (UNDP 1994). Impacts to fisheries will also have repercussions for the millions of people whose food security is provided by fish and fisheries. As discussed, many species that provide important food resources are at risk because of ocean acidification (Turley & Boot 2010) and rising water temperatures (Barange & Perry 2009). Ocean acidification is likely to place at risk important dietary staples, such as mussels (Cooley et al. 2011), and degrade the ecosystems that many fished species are dependent upon, such as coral reefs. Destabilised marine food webs, due to changes in primary productivity, could result in flow-on impacts to species that are important providers of protein. As ocean temperatures rise, productivity will likely decline in the lower latitudes, including the waters around sub-Saharan Africa (FAO 2010).

Health security

People depend on being able to stay healthy and free from disease. Many deaths in developing countries are linked to poor nutrition and an unsafe environment, such as unsanitary conditions (UNDP 1994). The deadly impacts from severe weather may extend long past the event itself and present a threat to people's health. For instance ground water supplies, especially those in informal settlements with limited or inadequate infrastructure, may become unfit for human consumption due to salt water intrusion from sea level rise, storms and flooding (Stark et al. 2009). The Wouri Estuary in Cameroon, for example, may see salt water intrusion for tens of kilometres due to the coupled impacts of sea level rise and decreased rainfall (Boko et al. 2007).

Increased lack of access to clean water may also be coupled with a substantial decrease in daily protein intake as access to fish decreases (as discussed above under food security). Communities may also be forced to turn to less traditional sources of food to find adequate nutrition. For instance, in Ghana, limited access to fish protein drove communities to consume larger amounts of bush-meat (Brashares et al. 2004), which not only threatened terrestrial wildlife populations, including primates, but also

meant greater risk during the hunt for food as well as greater risk of disease transmission (LeBrenton et al. 2006).

Community security

People derive security from belonging to communal groups, either as extended families, communities, racial or ethnic groups. The undermining of such security can come in the form of ethnic or sectarian violence or the loss of traditional relationships and values (UNDP 1994). Coastal communities affected by sea level rise and severe weather events may become less resilient and as lands become less habitable and livelihood and food resources become scarcer, may lead to competition and conflicts between different user groups (Homer-Dixon et al. 2011).

Natural resource use, such as artisanal fisheries, is often connected to cultural and community identities (FAO 2001), which may be lost as access to resources change. Traditional relationships and cultural values may also be undermined as community structures change through the large movements of people both in and out of communities. Resource scarcity can lead to large-scale migration; this in turn can cause conflict in host communities (Reuveny 2007) – conflicts that, if violent, could also act as threats to personal security. It has been estimated that by the end of the 21st century, 1.3 million inhabitants in sub-Saharan Africa will migrate each year as a result of climate change (Marchiori et al. 2010).

These impacts will be felt by coastal communities across the African continent; a continent that has been noted for its lack of mobility and access to capital to enable adaptation to help communities withstand and cope with such changes. The next section will address how adaptation programmes can act to not only ‘climate-proof’ communities but also aid in the prevention of conflicts.

Conclusion: Marine and coastal focused conflict-sensitive adaptation

Africa is identified as a continent that will be severely impacted by a disrupted climate system, as the continent has relatively low capacity to withstand and adapt to negative change (Boko et al. 2007). Consequently, a concerted effort is required to identify communities and countries most vulnerable to climate change through an analysis of: 1) the dependence upon marine and coastal resources, 2) the changes likely to take place within marine and coastal systems, and 3) the adaptive capacity of communities in question. Overlaying each of these factors will provide a more thorough understanding of the vulnerabilities of each community and will aid in the development and implementation of targeted adaptation and management programmes. Efforts to increase adaptive capacity, through boosting ecosystem resilience and alleviating pressures on

renewable resources, will not only help to 'climate-proof' communities, but will also act to better protect human securities and ease possible drivers of conflict.

Effective management and conservation of coastal and marine resources should be understood as sustainable development practice, as a part of conflict prevention, and an effective means of helping African communities to adapt to the impacts of climate change and ocean acidification. The ability of human and ecological systems to prepare for and respond to climate change, ensure human security and prevent conflicts will be determined by their resilience and robustness, or 'adaptive capacity' (Smit & Pilifosova 2001). In an unfortunate turn of fate, it appears that in many instances those countries with the lowest adaptive capacity are also those situated in climate change hotspots (Smith & Vivekananda 2008). This is particularly true across Africa.

Measures to boost adaptive capacity may be preemptive or reactive in that they help to avert the consequences of an impact or assist in adjusting to an impact that has occurred (FAO 2010). For example, dwindling numbers of an important commercial fishery may be adapted to preemptively by reducing catch sizes to increase fish population resilience and allow for the long-term continuation of the fishery (Akegbejo-Samsons 2008). Alternatively reactive adaptive measures may include fishing the population until its collapse and then switching the fishers to another industry. Preemptive measures will often ensure less disruption in both human and ecological systems than measures that try to adjust to impacts once they have occurred.

Preemptive adaptive measures will include efforts to boost the resilience of marine ecosystems by reducing or removing non-climate related pressures, such as overfishing and pollution, thereby enhancing the ability of these systems to better withstand the threats of a changing climate. For example, erosion is already a critical problem along most of the coast of Tanzania and is exacerbated by the removal of coral and coral sand for the production of lime (Masalu 2000). The erosion is expected to become more severe as the sea level rises and the incidence of extreme weather events increases (Masalu 2000). Reducing sand mining could act to enhance the resilience of this coastline and reduce the amount of future erosion that may otherwise take place. This would also reduce the loss of coastal lands, limiting the need for migration and, if done sensitively, replacing unsustainable jobs with more sustainable alternatives.

Healthy, robust coastal and marine ecosystems can also help to protect human communities from the impacts of climate change (Boisrobert & Viridin 2008). For instance, healthy mangroves and coral reefs can act as important storm breaks, absorbing substantial amounts of energy in the form of storm surges and reducing the extent of flooding that would otherwise impact coastal communities. Therefore, efforts to restore degraded coastal vegetation and the removal of practices that actively destroy these systems can be an important method of protecting coastal communities and infrastructure from increased severe weather events (Stark et al. 2009).

In order to better equip vulnerable African communities with mechanisms that will enable them to adapt to climate change and avert conflict it is vital that we develop a more holistic understanding of how marine and coastal resources are likely to change in the future and the resultant impacts on human security and stability. This knowledge will be instrumental in identifying the most vulnerable communities and preparing effective adaptation strategies.

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Climate change adaptation in Uganda: Conflict-sensitivity in forest conservation and management laws and policies

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Abstract

Africa is deemed to be one of the continents that is most vulnerable to climate variability and change. Africa's pressing development imperatives, which include inter alia poverty, poor governance, education, health systems and institutions, limited livelihood options, and so on, merely serve to exacerbate this vulnerability and contribute to poor adaptive capacity. In a bid to mitigate and adapt to climate change impacts, African states have adopted a number of legislative and policy measures. One such measure prioritises the conservation and restoration of forest ecosystems, which has been shown to reduce greenhouse gas emissions and alleviate land degradation and desertification. However, this has necessitated restricting and regulating civilian access to forests, frustrating communities' long-reliance on forest resources for food, fuel, medicine, income and so forth. African states are thus compelled to engage in a complex balancing act: mitigating, strengthening resilience and adapting to climate change impacts on the one hand; and on the other hand, ensuring that in the process citizens' livelihoods, domestic economic growth and national development goals are not compromised. Drawing on the case of Uganda, this Chapter aims to assess how successful the government has been in balancing these demands. The central question the Chapter seeks to answer is how conflict-sensitive Uganda's climate change adaptation strategy is. In other words, are Uganda's environmental and conservation laws and policies as currently formulated and implemented sufficiently sensitive and responsive to citizens' needs or do they aggravate tensions arising from competition for natural resources with the potential to ignite conflicts among and between citizens and the state?

Keywords: Uganda environmental -conservation, -law, -policy, natural resource competition, conflict-sensitive climate change adaptation

Introduction

Mr Henry Muganwa Kajura, Uganda's Minister of Water, Lands and Forestry in the Foreword to the Forestry Policy (2001: 4), asserts:

Uganda's forest resources are ideally suited to contribute to poverty eradication, wealth creation and the modernisation of the country. There is an urgent need to green Uganda by establishing new forest resources and rehabilitating degraded areas. Maintaining forest cover will help to conserve biodiversity and provide vital ecological services, such as soil and water protection. By addressing the ways that forestry can benefit people throughout Uganda, the government is fostering a common interest in its development, and a sense of inclusion across all groups and localities.

However, the case studies presented in this Chapter are instructive in demonstrating the contradictions between the stated objectives of Uganda's environmental conservation, protection and management regime, and the lived experiences of its intended beneficiaries. For example, the West Nile region has experienced significant displacement as a result of armed conflicts between the government and different insurgent groups, a consequence of which has been the encroachment on forest reserves by communities fleeing the conflict, and their increasing reliance on the same for livelihoods. But as this Chapter will demonstrate, while forests have long been a refuge and source of livelihood for local populations, it is becoming increasingly difficult for communities to access forest resources, even for non-commercial purposes.

Nevertheless, despite the state implementing policies that tightly regulate and restrict civilian access to forests, Uganda has continued to experience significant degradation of forest reserves and the attendant problems of desertification and environmental degradation. This is of concern to observers who fear that tensions between communities bordering on forest reserves – such as Lendu – and the government are being fuelled by the confluence of poor governance, competition for dwindling forest resources and disagreement on how best to manage and regulate access to these limited resources. There are fears that these tensions may even escalate into conflict, which raises an important question: how conflict-sensitive is Uganda's climate change adaptation strategy, in particular its conservation and management of forest resources? Are Uganda's environmental and conservation laws and policies as currently formulated and implemented sufficiently sensitive and responsive to citizens' needs, or do they have the potential to aggravate tensions and ignite resource-based conflicts between citizens and the state? The Chapter will argue that in order to be effective, Uganda's climate change mitigation and adaptation interventions must be sympathetic to local contexts; and further, that any policy developments of this kind must ensure the participation of all relevant stakeholders. The Chapter will conclude by forwarding recommendations aimed at strengthening the conflict-sensitivity of existing environmental protection and management measures in Uganda. The Chapter integrates four thematic considerations:

- A contextual overview of climate change and its attendant social and economic implications for Uganda.
- An analysis of Uganda's environmental and conservation laws and policies, particularly in respect of forest resource conservation, protection and management.
- Insight into government officials' perceptions of these laws and policies and their implementation as gleaned through interviews of key officials of the Zombo district local government.
- Providing insight into community perspectives on the impact of these environmental laws and policies and their implementation as derived from focus groups

and community dialogues facilitated in Zeu sub-county and to understand the implications of denying communities access – in law or practice – to forest reserves.

Background

Under the United Nations Framework Convention on Climate Change (UNFCCC 1994), climate change is defined as a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. During the most recent and seventeenth gathering of the Conference of the Parties to the UNFCCC (COP17) it was recognised that climate change poses an ‘urgent and potentially irreversible threat to human societies and the planet and thus requires to be urgently addressed by all Parties ... (with) the widest possible cooperation by all countries’ (UNFCCC 2011). Uganda is a party to the UNFCCC and the Kyoto Protocol. While it has ratified these treaties, it has yet to domesticate them, which poses a challenge insofar as operationalization of the frameworks is concerned. Under the above-mentioned international instruments, Uganda is obliged to put in place appropriate mitigation and adaptive measures to address the causes and effects of climate change as well as undertake education and awareness programmes (Uganda National Planning Authority 2010).

According to the Republic of Uganda’s National Development Plan for 2011–2014 (Uganda National Planning Authority 2010), the country’s sustainable economic and social development depends largely on the exploitation of its environment and natural resources. However, potential climate change impacts pose a serious impediment to the exploitation of Uganda’s environmental resources and adversely affect citizens’ livelihoods. On the other hand, the effects of climate change are felt in contexts that are already vulnerable, as a result of inter alia, the following mutually re-enforcing issues:

- over 80% of Uganda’s population lives in rural settings and is dependent on rain-fed agriculture, which is not only vulnerable to the adverse impacts of climate change but has also resulted in increasing encroachment on and degradation of forest ecosystems;
- population growth – with the fastest growth rates recorded in the most vulnerable ecosystems – and increasing demands for forest resources such as timber, fuel and food, agricultural and grazing land are equally responsible for the degradation of forest ecosystems and the natural resources they provide; and
- climate variability is negatively affecting crop production with the result that food security is precarious, leading to exploitation of other resources, such as forests (cf. Uganda’s National Adaptation Programmes of Action [Republic of

Uganda 2007]; Uganda National Environment Management Authority [NEMA 2006/7]).

In light of these factors, the majority of Ugandans are already vulnerable to the effects of climate change. Moreover, it should come as no surprise then that Uganda's forest cover has declined from 5 million hectares in 1990 to 3.7 million hectares in 2005 (NEMA 2006/07).

In a bid to protect forest ecosystems, the government has gazetted 698 forest reserves: 506 are Central Forest Reserves (CFR) and 192 Local Forest Reserves (Uganda National Planning Authority 2010). The central forest reserves, which account for 30% of the national forest cover, are managed by the National Forestry Authority (NFA) while the local forest reserves are managed by local governments. It is notable, however, that a significant portion of these reserves are degraded, in particular those under the local government arrangement. By 2002, the level of forest cover in gazetted forest reserves was 1.34 million hectares (43%) and this has been reduced to 1.3 million hectares (42%) in 2008, despite efforts by NFA to plant 35 000 hectares within the protected areas (Uganda National Planning Authority 2010).

Against this backdrop, the argument that climate change has the potential to lead to acute conflict becomes plausible (Tadesse 2010). With respect to deforestation (the result of climatic- and non-climatic factors), the consequences are serious and wide-ranging: desertification and its attendant soil erosion, loss of biodiversity, increased vulnerability of communities to climate extremes and reduction of livelihood assets for rural communities all contribute to a scarcity of natural resources that generates fierce competition within and between communities and also between communities and the state (Republic of Uganda 2007; Tumushabe & Mugenyi, 2005). If poorly managed, the authors assert that state responses to resource-related competition merely serve to escalate or exacerbate existing tensions. As Tadesse (2010: 7–8) notes, 'declining water resources and diminishing arable land are already intensifying competition for these resources and creating tensions among displaced populations' ... 'furthermore armed conflicts and intensified national security concerns minimise the capacity to cope with climate change'. Climate change is therefore a threat multiplier that exacerbates existing trends, tensions and instability (Tadesse 2010).

Uganda's forest conservation and management laws and policies

The Constitution of the Republic of Uganda of 2006 provides that the state holds and protects on behalf of its people the forests and any other land used for the preservation of nature (Art 237 (4)). The Constitution further provides that parliament shall by law provide for measures (Art 245) intended to protect and preserve the environment from abuse, pollution and degradation (Art 245 [a]); manage the environment for sustainable development (Art 245 [b]); and promote environmental awareness (Art 245

[c]). The government has enumerated these provisions in greater detail in a number of policy documents and laws.

The Uganda Forestry Policy (Republic of Uganda 2001) has as its objective the establishment of ‘an integrated forest sector that achieves sustainable increases in the economic, social and environmental benefits from forests and trees for the people of Uganda’ (Kasimbazi 2009: 205). The policy envisages the establishment by government of a regulatory framework to control illegal practices, monitor best practice, and measure environmental and social impacts (see Kasimbazi 2009). The policy recognises that a very wide range of people have a stake in the forest sector; people whose interests are not being fully addressed, and whose roles and responsibilities need to be defined and coordinated (Republic of Uganda 2001).

The National Environment Management Policy (NEMP) emerged from the National Environment Action Plan (NEAP) which had the overall policy goal of achieving sustainable social and economic development in a manner that maintains or enhances environmental quality and resource productivity on a long-term basis and ensures sufficient provision for both present and future generations (Akello 2007; Kasimbazi 2009; Republic of Uganda 2001).

The National Forestry and Tree Planting Act 8 (2003) provides for the conservation, sustainable management and development of forests for the benefit of the people of Uganda (Kasimbazi 2009). Forests are classified into the following five categories: (i) central forests reserves are maintained and controlled by central government; (ii) local forest reserves are the responsibility of local government; (iii) community forests fall under community control; (iv) private forests are overseen by individuals, groups(s) or institutions, including cultural or traditional institutions/ leaders; and (v) forests with wildlife conservation areas fall within the ambit of the Uganda Wildlife State of 1996 (Bazaara 2003; Muhereza 2006). The Act establishes the NFA, which is tasked with managing Uganda’s Central Forest Reserves and empowered to provide technical services such as providing information, training and advice on the management of forests; the establishment and maintenance of nurseries and other seed and plant facilities; providing material or financial assistance; and promoting seed production, agro-forestry and tree growing (Kasimbazi 2009; National Forestry and Tree Planting Act 2003).

The National Environment Act (1995) is the framework law for the sustainable management of Uganda’s environment (Akello 2007; Kasimbazi 2009). The NEMA was established under this Act to coordinate, monitor and supervise all activities relating to environmental management. The Act requires NEMA in consultation with the NFA to issue guidelines and prescribe measures for the management of all forests in Uganda in line with the principle of sustainable development (Kasimbazi 2009). It further encourages the maximum participation by the people of Uganda in the development of policies, plans and processes for this management.

The contemporary forestry and environmental conservation and management frameworks above marked a shift away from customary rights-based regulations, which were premised on the cultural systems of tribal communities according to their material needs; here, individual and tribal claims on forests and forest products were strongly defended against contenders, with recourse to force if necessary (Bruenig 1996). However, when government centralised the management of forest resources in 1967, approaches used by local communities to limit entry and harvesting of forest resources lost their legal standing and in their stead, government appointed personnel to guard forest reserves (Banana et al. 2001). This has proven ineffective for two reasons (Banana et al. 2001; Namara 2006): firstly, Uganda's forests are scattered over vast areas and therefore require a larger deployment of guards than the government is able to afford; and secondly, forest guards do not have a personal investment or stake in the forest and therefore lack motivation to police effectively – a factor exacerbated by their susceptibility to bribery in light of their less than generous earnings.

It should, therefore, come as no surprise that despite the comprehensive forest conservation and management frameworks, Uganda's forest resources have continued to decline, and in doing so are provoking competition for and conflict over dwindling forestry resources. The trend is one of loss of cover and degradation of Uganda's remaining forest resource base, with an area of 280 000 hectares (at least a third of this valuable national resource) recorded as degraded in the tropical high forest; with respect to government forest reserves, which cover 1.1 million hectares, there is less than 740,000 hectares of forest cover remaining – a loss of 35% of cover (Republic of Uganda 2001: 2). The Policy further highlights that encroachment and clearance for agriculture, overharvesting and urbanisation are just some of the key factors to which the decline of the forest resource base is attributed.

It is against this backdrop that the Ugandan government was motivated to pursue a Collaborative Forest Management approach (see Bazaara 2006; Namara 2006; Muheza 2006). As Bazaara (2006: 24) notes, the government sought to overcome 'the old problem of conflicts arising because of groups that wanted to access the protected resources and were using illegal means to make their point'. The adoption of this approach was justified on the basis that it would improve the participation of local people in the management of protected area resources so as to increase both their stake in and responsibility for forest reserves ecosystems – a role the government came to realise it could not play alone in light of strains on its human, material and financial resources (Banana et al. 2001; Bazaara 2006; Namara 2006); it would provide communities with benefits such as access to protected areas for spiritual purposes, give them regulated access to natural resources from protected areas and give them a share of the revenues generated from these areas as a poverty alleviation and reparation measure (Bazaara 2006; Namara 2006).

The importance of the participation of local communities in the management of forests and other natural resources is also emphasised by Onencan (2002) in relation

to the Lendu forest. Specifically, Onencan (2002) indicates that local participation is important because of the following:

- local communities feel a sense of entitlement to natural resources, policing usage is unlikely to alter behaviour in the way that education and involvement can;
- implementation of policies and laws and the pursuit of development imperatives are strengthened where these reflect the values of the people for whom they are intended, otherwise they remain words on paper;
- the dictates of fairness call for the equitable enjoyment of natural resource benefits by all stakeholders;
- pragmatists note that management costs are reduced significantly by involving local communities, especially once trust is established between all concerned;
- involvement allows for a sense of ownership, which is especially important with respect to responsibility for bad conservation habits;
- local communities possess indigenous knowledge that can be drawn upon for sustainable resource use; and
- poverty, land tenure and other socio-economic pressures, will always place demands on natural resources and that is why all affected stakeholders including local communities should work towards sustainable conservation.

The Collaborative Forest Management scheme envisaged the creation of resource-user institutions constituted of government and community representatives, who would use this forum to deliberate on and pass binding decisions on matters such as which resources could be harvested, acceptable quantities, the periods during which to harvest, and so forth (Namara 2006; Onencan 2002). However, as Bazaara (2006: 20) argues, when incentive structures are flawed, local actors ‘collaborate with users of the forest resources to extract short-term gains, generating negative environmental outcomes’. The Environmental Audit Report on Forestry Activities in Uganda (Office of Auditor General 2010) similarly concluded that the mandate of the districts with regard to sustainable forest management is not being adequately undertaken. The following case study is intended to illustrate the factors responsible for this state of affairs.

The case of the Lendu Plantation Management Area

The Lendu Plantation Management Area is located in Zeu sub-county, Okoro County, Zombo district (formerly Nebbi district – Zombo district was created in 2009), in the West Nile region of Uganda, bordering on the Democratic Republic of Congo (DRC). The West Nile region has experienced widespread population displacement as a re-

sult of conflicts between the Government of Uganda and different insurgents groups within the region. Since 1986, when Museveni's National Resistance Movement/ Army took power, rebellious groups such as the Uganda National Rescue Front, the West Nile Bank Front and the Lord's Resistance Army (LRA) have wreaked havoc, and displaced and disposed communities of their land and means of production. The armed conflicts between the different insurgent groups and the Government of Uganda have been attributed to the perceived marginalisation by successive regimes of this region (Lomo & Hovil 2004). The Ugandan-based Beyond Juba Project (BJP 2011) notes that 'while most of the region became fairly stable, particularly following the peace agreement signed between the Government of Uganda and the Uganda National Rescue Front in 2002, key elements of the peace agreement remain unmet and peace in the region remains unstable'.

The Lendu Plantation Management Area consists of four reserves, namely, Lendu, Usi, Awan and Okavu-reru. Lendu Forest Reserve falls within Uganda's Central Forest Reserves while Usi, Awang and Okavu-reru are local forest reserves. The Table below indicates the status of the forest cover of the Lendu Plantation Management Area in hectares.

Table 1: Lendu Plantation Management Area

Reserve	Total Area	Area Planted
Lendu	2 378 ha	536.5 ha
Usi	433 ha	112.6 ha
Awang	162.6 ha	150 ha
Okavu-reru	422 ha	95.8 ha
Total	3 395.6 ha	853.5 ha

(Source: Oyiyo 2011¹)

From the figures presented in Table 1, it is apparent that the planted area in Lendu is disproportionately small relative to the total area and in comparison to the same ratio in other sub-counties. This suggests that the rate of forestation in Lendu may be insufficient to replenish the existing areas, which are subject to severe consumptive demands.

The indigenous tribes living in the areas bordering the forest are Alur, Lendu and Kebu. As in the majority of Uganda's rural communities, most of Zombo district's local community depends on forest resources to meet their subsistence, energy and related needs (Kasimbazi 2009). Electricity supply and distribution is still very limited and tariffs beyond the reach of most rural people (see Uganda State of the Nation Ad-

1 Oyiyo D, NFA presentation at a community dialogue, Zombo District, August 2011.

dresses 2010 and 2011²). Kasimbazi (2007: 199) observes that biomass (i.e. firewood, charcoal and crop residues) accounts for over 90% of Uganda's total energy consumption. The reliance on forest-based resources for energy consumption at the local level is therefore clearly evident,

The challenges confronting Zombo are not unique. They are symptomatic of the broader reality of inequitable distribution of resources in Uganda, which goes some way to explaining the feelings of frustration and marginalisation expressed by participants of the community dialogue convened by the [lead] author (August 2011, Zombo district). Local community members of Zeu expressed the view that the central government is milking its resources without feeding them. This is not an isolated sentiment as Muhereza (2006) and Namara's (2006) research shows:

... the 1997 Local Government Act was enacted by parliament, and conveyed to local government the power to levy and collect taxes, and receive payment from the centre to undertake decentralised services ... [however] powers to levy, charge, collect and appropriate fees and taxes from forest resources in central forest reserves have been retained by the centre.

(Muhereza 2006: 76-77)

... revenue sharing ... remains a contentious issue, often challenged ... Communities around various protected areas have questioned the basis of the 20% figure and why it is a fraction of only gate-entry fees and not total revenues ... managers on the ground often answer that the law provides for this arrangement which can only be changed if the law is reviewed by parliament. Rural communities know that ... influencing parliament to advocate issues important to communities at the periphery of political influence ... is an impossible task.

(Namara 2006: 51-52)

Further, as Bazaara (2006: 25) notes in his research on the collaborative management arrangements around Bwindi:

... the line ministry ... designs the collaborative project and invites the community to participate in it. Representatives of the communities cannot veto or change decisions already made by the forestry department. Communities may be consulted but the central government has no obligation to take into account their feelings or views ... These programmes appear to serve a mechanism of the central government to legitimise its conservation policies and to ensure that its actions are beyond reproach.

The local community of Zeu expressed hostile feelings towards a government perceived to be exploiting the Lendu Forest Reserve with little thought spared for the needs of the indigenous people. In the case of Bwindi Impenetrable National Park, the Batwa's (pygmy) needs, which included fish from the rivers, wild yams, wild honey, and access

2 State of the Nation Address by H.E Yoweri Kaguta Museveni, President of the Republic of Uganda, 1 June 2010 and State of the Nation Address by H.E Yoweri Kaguta Museveni, President of the Republic of Uganda, 8 June 2011.

to ancestral sites was not addressed in the resource access programme leading, justifiably, to the Batwa feeling that their needs were marginalised (Namara 2006).

The manner in which the NFA is managing Lendu's forest resources leaves a great deal to be desired: the local community feels excluded and denied agency, unable to contribute to decisions that affect them. The regulation of usage is inefficient with planting no longer systematically done according to plan with the result that the maintenance of forests – even against the outbreak of fires – is more challenging due to the scattered formation of the trees³.

Corruption and mismanagement are further grievances expressed by local communities. Bazaara (2006) notes that many forest resources have been encroached upon as a result of local politicians attempting to carry favour with their electorate. This author has also noted that permission to harvest lucrative resources (generally commercially-viable forest resources such as timber) goes to the wealthy and politically connected; whereas 'local rural populaces end up with resources, which in comparative terms, are insignificant and aimed at poverty alleviation' (Bazaara 2006: 29). In such a climate, unless steps are taken to address the grievances expressed, it simply becomes a matter of time before disgruntlement fomented into violent protest.

In developing and implementing its environment protection and conservation strategy, NFA had very good objectives, which included improving the management of the CFR with the aim of creating a sustainable yield of forest products and income through agreed management plans. It further sought to ensure that CFRs are managed through a collaborative management arrangement involving local government, communities, and private investors, therein creating employment opportunities and contracts for communities. However, the NFA has fallen well short on these objectives as evidenced by the following:

- Before the NFA assumed management of the reserve, Lendu forest was the biggest revenue earner for the district generating about 400 million shillings (US\$153 840) per fiscal year⁴. However, although the Uganda Forestry Policy clearly states that 40% of the revenues collected should be given back to the local government, this is very difficult to determine as the districts claim that they are kept in the dark of the total revenue collected by the central government. The only money the district is certain of is the 30 000 shillings (US\$12) collected from every truck ferrying logs. Since this is the main revenue earner in the area, having it managed by the central government undermines the principle of the decentralisation of power.

- 3 Oyeny-Keo, C. (2011) Interview with the Author on 8 August. Zombo [Audio recording in possession of author].
- 4 Athocon, J. (2011) Interview with the Author on 8 August. Zombo [Audio recording in possession of author].

- Related to the above, the licensing process has excluded the local people from participating in the commercial exploitation of forest resources: not only are NFA permit fees prohibitive for the ordinary inhabitant of Zou – considering for example that capital of 10 million shillings minimum (US\$3 846) is required for a pit sawing license – but in addition, the permit can only be obtained in Kampala and can take upwards of six months to be granted with the implication that an applicant not resident in Kampala must have the means to travel to the capital as many times as is required to apply and collect the permit once issued. One of the participants in the community dialogue noted:

[Inasmuch] as the NFA is trying to harvest or sell off these trees to big investors who can pay a minimum of 10 million shillings per cubic metre, our people cannot participate and get something there. The NFA has made it very difficult for locals to access trees to convert them into timber; they have complicated the system to the extent that if you want five trees, you must go to Kampala since they have failed to set up an office in the district to handle this⁵.

Consequently, the people who benefit from Lendu forest originate from other parts of the country, predominantly central and western Uganda. Invariably, this is causing tensions between the locals, ‘foreigners’ (people coming from outside of Zombo) and the NFA.

- There is also widespread corruption within the administration of Lendu Forest Reserve. The Executive Director of the NFA, Damian Akakwansa, was suspended from office in October 2010 and is currently facing corruption charges. Akakwansa is accused of causing financial losses of 760 Million shillings (US\$292 308) by allegedly disposing of 40 000 cubic metres of eucalyptus in Lendu Forest Reserve to M/s Nile Plywood Uganda at 46 000 shillings (US\$18) per tree instead of 65 000 shillings (US\$25)⁶ (Anyoli 2011).
- The local community is suspicious of the actions of the NFA owing to the heavy deployment of guards in and around the Lendu Forest Reserve. When the forest was planted in 1958, it was envisaged as a source of employment for the local people; however, since the NFA has assumed responsibility, communities bordering the forest are largely denied access to its productive areas. There are no local people occupying senior positions – these are staffed overwhelmingly by ‘foreigners’ (i.e. people from other districts), who are not familiar with the local context and who therefore tend to view the local community as a threat to their authority (Namara 2006), hence the heavy deployment of guards. Namara (2006: 44-45) makes a similar observation, noting that ‘increased control

5 Kakura, E. (2011) Interview with the Author on 8 August. Zombo [Audio recording in possession of author].

6 Ex NFA boss Akankwasa out on bail. *New Vision Online* 20 May 2011. Accessed 28 July 2011, <http://www.newvision.co.ug/D/8/13/755268>

and protection of (Bwindi) forest by state agencies created a sense of alienation among local communities [and] hostility between the park authorities and communities around the park'. Furthermore, Namara (2006: 55) asserts: 'Attempts to decentralise effective decision-making over natural resources management are usually resisted by those institutions or individuals who will lose power in the process'.

- The local people bordering Lendu say that they are denied access to the forest to collect firewood and cultivate crops on the bare land and in the valleys. As deforestation of the land available to them worsens, many of them are compelled to migrate. The Lendus, the tribe from which the forest derives its name, are poor and lack even the most basic services. They have neither access to nor control of the land. Some have migrated to the neighbouring DRC to cultivate their crops. Those remaining in Zeu do not have any representatives in key decision-making positions, and they have only one primary school. People could not recall a single member of the tribe to have ever attained a degree; and the only diploma holder identified has passed on⁷.

The combination of substantive and procedural discriminations faced by the local communities bordering the Lendu Plantation Management Area as described above, together with the polarising binaries between stakeholders (locals vs 'foreigners'; local community vs NFA/government/forest guards, etc.) makes for a lethal environment, which would not require a great deal to spark a violent confrontation between the stakeholders concerned. Bazaara's (2006: 30) damning indictment is that 'collaborative management schemes appear not to lead to sustainable environmental outcomes. These schemes lead to conflict'. Responding to these concerns and impacts requires conflict-sensitivity, a neglected area of research in forestry contexts.

Conflict-sensitive dimension

Conflict is a natural multidimensional phenomenon that is typically indicative of change within society and it occurs when two or more parties believe that their interests are incompatible, express hostile attitudes or take action that damages other parties' ability to pursue their interests (Africa Peace Forum et al. 2004).

Conflict-sensitivity means the ability of an individual or organisation to:

- understand the context in which they operate;
- understand the interaction between their intervention and the context for which it intended; and

7 Anyolitho, W. (2011) Interview with the Author on 8 August. Zombo [Audio recording in possession of author].

- act upon the understanding of this interaction, in order to avoid negative impacts and to maximise positive impacts.

(Africa Peace Forum et al. 2004)

It is almost seven years since the NFA took over the management of the Lendu Plantation Management Area from the district forestry services. As much as the policy documents, including the National Forestry and Tree Planting Act (2003), encourage public participation in the management and conservation of forests and trees; there is a lack of implementation of these commitments in practice as exemplified by the tensions between the local communities, district local government and the NFA. The National Forestry Policy, for instance, is laudable on paper but very weak in terms of implementation as manifested in the exclusion of local communities from accessing the forest reserves, especially as a result of the prohibitive costs, the inaccessible licensing process, and corruption which favours the wealthy and politically connected.

Further, it has been widely documented in the different policy documents that a significant level of deforestation occurred when the forest reserves fell under the forestry department. However, the opposite is true: the high levels of corruption within the NFA and the negative impact the intervention has on the surrounding population is hindering this intervention from being considered a success (Bazaara 2006; Muhereza 2006). In other words, the intervention of the NFA continues to do more harm than good. There is limited provision in the current forestry law for legal agreements between the state and community groups to manage forests. This shortcoming is compounded by the findings of an Environmental Audit Report on Forestry Activities in Uganda, July 2010, which found that the regulations to operationalise the National Forestry and Tree Planting Act 8 of 2003 have never been developed as required by the Act. Without these regulations, adherence to the provisions of the Act may not be effectively enforced. Even the government acknowledges that there is still a lot of inconsistency in the legal and policy framework, and weak institutional arrangement for management of the entire forestry resources in the country (Uganda National Planning Authority 2010). Under the same plan, government aims, through forestation, to restore forest cover from 3 604 176 hectares to 4 933 746 hectares (to 1900 levels) by 2015, and 1 266 000 hectares in 698 forest reserves. Government has also committed, in the National Development Plan, to increase the involvement of the population in tree planting by stepping up the supply of free and/or subsidised tree seedlings to farmers in agro-forestry systems. The Uganda Forestry Policy (Republic of Uganda 2001) states that new institutional relationships should enhance efficiency, transparency, accountability and professionalism, and build confidence in all forest stakeholders.

As things currently stand, there is no community ownership of forest management and the relationship between the local communities and NFA can be described as hostile. In many parts of the country, communities living in areas bordering on forest reserves have often clashed with NFA officials leading to deaths in some instances. NFA

has acknowledged the hostility of the communities: ‘In some areas, communities are very hostile. A case was witnessed where the locals were pit-sawing and when the patrolmen went to stop them, they threatened them with pangas and arrows’⁸. The following are some of the views on the NFA expressed during the community dialogue session:

Locals got a raw deal with NFA, they were never consulted on the takeover, they just saw a heavy deployment of soldiers who harass them.

The relation between the NFA and local people is very bad. They can’t look each other in the eye.

NFA is making billions from the forest but not a single desk has been given to a school in the area.

We want our forest back, we have been robbed. This is [like] cooking food, [which] you put on a table and then you are chased away.

Locals are marginalised whilst tribes from central Uganda and western Uganda, like the Banyankole, Bagandas and Bakigas who have the means to pay NFA exorbitant sums of money to access the forest, are prioritised.

To avoid exacerbating existing tensions, the NFA has underscored the need to engage with district leaders and communities to actively support forest conservation and tree-planting efforts – however, they are supposed to have been overseeing Lendu in accordance with the principles of collaborative forest management in any event, which suggests that the problem is not one of strategy necessarily, but of a lack of political will.

Can the NFA be described as conflict-sensitive? The analysis above does not support a view of the NFA as responsive to its context, as having a conscious grasp of its intervention and their relationship to the environment for which they are intended, and as having an awareness of and endeavouring to minimise negative impacts and maximise positive ones. The following section will, therefore, put forward recommendations on measures that the NFA could contemplate to strengthen its conflict-sensitivity.

Recommendations

In light of the predicted impacts of climate change, are Uganda’s environmental and conservation laws and policies as currently formulated and implemented sufficiently sensitive and responsive to citizens’ needs? Or do they aggravate tensions arising from competition for natural resources with the potential to ignite conflicts among and between citizens and the state? In order to strengthen the conflict-sensitivity of Ugan-

8 Oyiro, D. (2011) Interview with the Author on 8 August. Zombo [Audio recording in possession of author].

da's forest management and conservation laws and policies, and to ensure conflict-sensitivity in adaptation to climate change, there is a need to take account of the key findings from this Chapter, which focus on the need for participation, access, coordination and cooperation and conflict resolution in managing forest resources and in policy formulation.

For Uganda, and for conflict-sensitive adaptation to climate change, this Chapter has demonstrated that top-down forest management should be abandoned in favour of a genuine commitment to collaboration between forest agencies and local communities. This is crucial and measures should be put in place to ensure that the voices of all the people affected by the management of forests are heard. Local participation – or at the very least representation – in decision-making fora must be facilitated, and comprehensive, robust, consultation (as opposed to the rubber-stamping that currently occurs) pursued in order for community needs to be reflected in forest management plans. Dialogue between the local government, local communities and forestry authorities (such as the NFA) should also be facilitated in order to restore confidence in forest management institutions. In order to promote collaboration, employment quotas may be contemplated to encourage the recruitment of local community members. In the Ugandan case, this would address the grievance of marginalisation and exclusion from job opportunities identified by community members as a key aggravating factor in tensions between locals and forest management personnel originating from elsewhere.

In relation to cooperation and coordination, the Ugandan case demonstrates that responsibility for the sustainability and management of forest ecosystems falls not only to the government but to all stakeholders. Awareness-raising and capacity strengthening programmes highlighting the need to conserve, replenish and responsibly use forest resources (in an effort to change attitudes, behaviours and ultimately consumptive patterns) would reduce the need, for instance, for reliance on heavy-handed enforcement of rules and regulations.

For Uganda, specific recommendations from this Chapter include the need for licensing offices to be rolled out nationally beyond Kampala to make them more accessible to local communities, particularly in light of the fact that the livelihood options of rural communities are so heavily reliant on the exploitation of natural resources. Moreover, licensing tariffs should be revisited, and perhaps disaggregated according to means so that they are accessible to local communities and do not remain the preserve of political and economic elites. To further promote equity, transparency and accountability, revenue sharing regulations and disbursement procedures should be revised where necessary. In addition, oversight mechanisms, checks and balances and regular audits should be introduced to discourage fraud, corruption and mismanagement of forestry-related funds. Strict penalties should be enforced for transgressions to demonstrate a genuine political commitment to sound forest management practices.

To ensure the sustainability of collaborative efforts, and coordination, in forest policy formulation and forest management, non-violent conflict resolution should be pro-

moted. Conflict-sensitivity in national governance is crucial. Environmental and conflict concerns should be integrated into overall national planning through coordination with the relevant ministries, departments and agencies of the government to ensure that they are suitably prioritised and budgeted for. Constant monitoring and evaluation should be conducted to gauge whether or not forest management agencies are meeting their stated objectives, to provide conflict early warning services, and to identify the changes that may need to be made to ensure that they remain on track. In the Ugandan case, an independent forest ombud or arbitrator should be contemplated to provide a forum for non-violent resolution of disagreements and disputes.

Conclusion

The decline and degradation of Uganda's forests has persisted despite comprehensive policy and legislative measures intended to reverse this trend. This is problematic for a number of reasons. Firstly, forests have been shown to ameliorate climate change impacts by among other things stabilising temperatures and controlling soil erosion. However, and more importantly for the purpose of this Chapter, forests are also a source of livelihood for a significant proportion of Ugandans and as this resource declines, there is increased competition for and conflict over scarce forest resources. What this Chapter has sought to show is that in order to avert competition for scarce resources escalating into violent conflict, states will have to adopt conflict-sensitive climate change adaptation strategies. These require a shift away from centralist government, top-down and authoritarian forest management approaches to more localised and collaborative initiatives, which facilitate the involvement of all affected stakeholders in decision-making and ensure an equitable enjoyment of the benefits flowing from forestry ecosystems.

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III.

Drought, mobility and migration

Linkages between climate variability, vulnerability and armed conflict in sub-Saharan Africa. A review

Nina von Uexkull

Abstract

This Chapter reviews the current state of knowledge about linkages between climate variability and armed conflict in sub-Saharan Africa. It focuses on two questions: What do we know about the links between climate variability and armed conflict? What are the factors that increase the propensity of conflict in specific locations following climatic variations like droughts and excess rain? The review draws on recent studies that use data on the geographic location of armed conflict events that together with other disaggregated data allow for the study of sub-national variations in conflict, climate variability, and vulnerability and thus, areas that demand attention for conflict-sensitive adaptation to climate change. The Chapter concludes that there is currently little robust evidence for the claim that civil wars are directly caused by climatic variations. However, communal conflict between non-state groups might to a greater extent be affected by climate variability. Vulnerability to conflict due to climate variability is likely to be exacerbated by fragile ecological conditions (in particular in the Sahel region of Africa), poverty, political marginalisation and a history of conflict.

Keywords: climate change, civil war, communal conflict, vulnerability, climate variability, sub-Saharan Africa, environmental security

Introduction

What will future climate change bring? Will we see a cascade of changes that will have devastating effects for societies, including igniting armed conflicts as some prominent policy-makers like US president Barack Obama warn (The Economist, 2010)? Climate change is projected to lead to increases in the variability of the climate in the short-term paralleled by an increase in temperature. This may leave millions of people exposed to increased water stress (Boko et al. 2007: 443–444). Water scarcity is one of the core issues of concern in particular for sub-Saharan Africa, where presently about one third of the population inhabits drought-prone areas (Boko et al. 2007: 437). In particular, agricultural production, including access to food, is projected to be severely compromised (Boko et al. 2007).

While dire consequences of a lack of access to freshwater and food for the livelihoods of many seem evident, it is still hotly debated if and under which circumstances the predicted increase in the scarcity of natural resources will also have an impact on the number and kind of future armed conflicts (Burke et al. 2009; Buhaug 2010; Hsiang et al. 2011). A major obstacle to the scientific study of this question is the double uncertainty regarding the long-term effects of climate change. Climate models to

date face considerable uncertainty. Tipping points that spark a cascade of environmental changes are difficult to predict (Lenton et al. 2008). In addition, models created to predict the onset of armed conflict still fare quite poorly (Gleditsch 2012; Ward et al. 2010). This double uncertainty renders it difficult to clearly predict the consequences of long-term climate change on conflict in specific regions.

However, the study of past climate variability and natural hazards may still have great value for assessing the security implications of climate change. Climate variability refers to variations of the climate beyond that of individual weather events – that is, for example, deviations from the mean state in precipitation and temperature and the occurrence of extremes (Solomon et al. 2007). While it is difficult to establish scenarios for future changes, if a clear causal link between past climate variability and conflict in the past is found, this link should persist in the future, when an even more variable climate is predicted for many regions (Boko et al. 2007). Thus, based on this premise, research on past climate variability may reveal potential linkages and potential threat multipliers that should be of great relevance for conflict-sensitive adaptation to climate change.

Climate variability, in particular short-term variations in precipitation and temperature, can have both positive and negative impacts on livelihoods. For example, rainfall abundance may enhance access to food. Yet, both droughts and excess rainfall leading to floods increase renewable resource scarcity. Due to droughts or floods, the overall amount of limited natural resources such as freshwater to each individual is depleted on a rate faster than the rate of regeneration (Homer-Dixon 1999). Thus, both natural resource abundance and scarcity may be the result of deviations from normal temperature or rainfall patterns.

This Chapter will review the state of knowledge contained in the growing literature on the linkages between climate variability and armed conflict in sub-Saharan Africa. In particular, it will draw on insights from recent systematic studies using a large number of cases that allow us to draw conclusions about the general strength of the climate-conflict relationship. The Chapter will begin with a discussion about recent findings on the linkages between climate variability and the onset of armed conflicts. Then, the knowledge about threat multipliers and factors increasing the risk of armed conflict following climatic variability will be summarised. The final section concludes with implications for research and policy.

Could climate variability lead to the outbreak of armed conflicts?

Of utmost relevance for conflict-sensitive adaptation to climate change is the question of whether climatic variability could increase the risk of armed conflicts, directly or via their impact on other factors. For instance, if a region is expected to experience more natural disasters, it is important to know whether this is likely to ignite armed

conflicts and what issues require preventative action. Before moving to discussing the scientific evidence, the logic for how climate variability may increase conflict risk will be briefly reviewed.

First, most directly, droughts and excess rainfall resulting from climate variability could increase the scarcity of resources such as arable land and water, which are critical for the livelihoods of many. It has been argued that these scarcities could lead to disputes, which may escalate in violence (Homer-Dixon 1999). For example, in Ethiopia, frequent clashes over water holes took place between the Issa and Afar pastoralist groups during the 1990s. The tensions culminated during the drought of 2002, when large-scale violence took place (UCDP 2012).

Second, if climatic variability bears adverse economic impact it can also facilitate the recruitment of fighters by increasing the individual's willingness to participate in fighting (Collier & Hoeffler 2004; Miguel et al. 2004). Miguel et al. (2004) argue that rainfall shortages will manifest themselves as economic shocks that lead to a downturn in economic activities in subsistence economies. The African economy largely relies on rain-fed agriculture not only for food production, but also for income. Two-thirds of the labour force is employed in the agricultural sector (Stern 2006). Thus, a change in rainfall leading to poor harvests or a lack of grazing land will have an immediate negative impact on food production and the income of large segments of the population (Stern 2006). Deprived of their subsistence, it has been argued that people are more willing to participate in fighting because of low opportunity costs (Collier & Hoeffler 2004; Miguel et al. 2004). Participation in fighting may then also serve as an alternative source of income and status (Barnett & Adger 2007). This happened, for example, in the Tigray rebellion in Northern Ethiopia in the 1980s, where the ranks of rebels swelled in unprecedented numbers during famine (De Waal 1991).

Third, climate variability could deepen inequality in economic development in a society. This may, in turn, trigger armed conflict. Faced with declines in agricultural output, with agricultural yields otherwise needed for food and income, poor rural households may be forced to sell assets at distress prices to finance food purchases (Sabates-Wheeler et al. 2008). In contrast, people with a higher income are usually not as vulnerable to disasters (*ibid.*). Thus, adverse economic effects of climate variability are likely to widen the gap between the haves and the have-nots. In societies that are cleaved along ethno-cultural, religious or class lines individual grievances more easily translate into group grievances (Kahl 2006). Inequality then can lead to political violence if economically deprived groups blame other groups for the predicament they face and decide to take up arms to challenge the elites which they believe are either the cause or the beneficiaries of the unfair distribution of resources (Gurr 1993; Homer-Dixon 1999; Kahl 2006). As Barnett and Adger (2007: 645) argue, 'because contraction in the livelihoods of some sections of society most often imply increasing inequality (since others are not affected, or may indeed prosper), then this can create conditions more conducive to the outbreak of violence'.

In sum, climate variability may increase conflict risk directly or indirectly via its negative economic impacts. However, this relationship is not argued to be deterministic. The national government plays a key mediating role in that it could either aggravate or alleviate the negative effects of climate variability. Where governments provide efficient disaster relief, the negative effects of climate-related natural disasters can be mitigated (Barnett & Adger 2007; Raleigh 2010). However, governments can also exacerbate the negative effect resource scarcity has on the population and, for example, exploit resource disputes for their own profit (Kahl 1998; 2006). As seen in Kenya in the early 1990s, competition over land provided opportunities for Kenyan elites to gain power and wealth by mobilising ethnic groups against each other (Kahl 1998). The willingness and capabilities of governments to prepare for disasters and address existing grievances is therefore a key mediating factor.

While case-based evidence for environmental conflict such as the Kenyan case is valuable in providing context-specific understanding, the systematic study of a large number of cases may reveal the general strength of the climate-conflict relationship. It would also allow researchers to estimate the significance of short-term climate variability relative to other factors. The conduct of these important studies on the climate-conflict linkages has been enabled by the recent collection of data that allows for the study of local variations in the environment and conflict (Sundberg & Melander 2013; Raleigh 2010). This is important as acute climate-induced resource scarcity is felt locally. Civil wars, and even more so communal conflict, rarely engulf entire states, and also local resilience to environmental hazards varies (Theisen 2012; Cederman & Gleditsch 2009; Field et al. 2012). Therefore, an analysis of sub-national variations is important to estimate the immediate impact of climate variability, and to map areas at risk.

Systematic empirical evidence

To evaluate the evidence of a systemic conflict-driving effect of climatic variability, it is important to distinguish between different forms of armed conflict that vary in geographic patterns, duration and average fatalities (Pettersson & Themnér 2011). While communal conflict between communally-identified groups based on religious, ethnic or language identifiers and without the direct involvement of the state usually takes the form of short outbursts of fighting, intrastate conflict where the government is one of the warring parties usually are of a much longer duration (Pettersson & Themnér 2011). The different forms of armed conflict also differ at least partly in their causes (Cunningham & Lemke 2011). Thus, also the impact of climatic variations on different types of conflicts may vary. For example, using the same climate indicators and models, Raleigh and Kniveton (2012) find that while communal violence is particularly common in anomalously wet periods, rebel violence in intrastate conflict is more frequent in times of drought in East Africa. The strategies to prevent the outbreak of violence thus may need to be tailored to the specific form and context the armed con-

flicts occur in. Scientific evidence for the linkage between climate variability, intrastate conflict and communal conflict will be discussed next.

Intrastate conflict and climate variability

Much attention has been devoted to the effects of climate change and variability on intrastate conflict. In intrastate conflict, also referred to as civil war, a state government is challenged by one or more internal organised opposition groups. This is, for example, the case in Mali, where Tuareg rebels fight government troops (Themnér & Wallenstein 2011). With regard to the climate, *prima facie* evidence for the purported link to intrastate conflict is poor. A tentative analysis of key conflict issues in intrastate conflicts does not show any evident connection to climate change (Krampe 2010; Mobjörk et al. 2010).¹

A couple of prominent studies confirm the alleged association between anomalies in rainfall or temperature and the onset and dynamics of large-scale civil wars (Burke et al. 2009; Hsiang et al. 2011; Miguel et al. 2004; Nel & Righarts 2008). Raleigh and Kniveton (2012) show that rebel violence is more likely in anomalously dry periods of the year in a study of sub-national variation in conflict events. O'Loughlin et al. (2012) conclude that higher levels of rainfall decrease the risk of violence, while higher temperature increases this risk. However, they do neither find a direct effect of droughts nor an effect conditioned by political rights or political exclusion in the affected areas. According to Maystadt and Ecker (2014) drought drives local variations in conflict in Somalia through its impact on livestock prices.

However, there are also comprehensive studies showing that droughts are not associated with the onset of civil wars (Theisen et al. 2011; Wischnath & Buhaug 2014). There is even some evidence for a rather pacifying effect of natural disasters (Slettebak 2012).

In sum, it can be concluded from the state of knowledge today, that climate variability appears not to be very robustly linked to the outbreak of intrastate conflict. This is in contrast to other factors such as poverty and political marginalisation, which are commonly accepted to increase conflict risk (Gleditsch 2012; Theisen 2012; Ward et al. 2010).

1 This does not mean that environmental degradation could not be one of the grievances expressed by rebel groups. For example, the Movement for the Emancipation of the Niger Delta (MEND) portrays itself as representing the grievances of the people of the Niger Delta against government corruption, environmental degradation, and perceived mismanagement of oil revenues (Hanson 2007). However, access to water or a clean environment has not been the primary stated demand of rebel groups.

Communal conflict and climate variability

While the evidence for a link between the climate and intrastate conflict is quite inconclusive, the theoretical arguments in the environmental security literature probably speak most directly to different forms of violence with no direct state involvement (Gleditsch 2012). These conflicts have been conceptualised as non-state conflict, which again is an umbrella term for different forms of violence (Sundberg et al. 2012). The most likely climate-related conflict type appears to be communal conflict fought between communally-identified groups along ethnic, religious or language lines. In contrast to other conflicts where the government is not involved, such as rebel groups fighting each other, communal conflict is often fought over access to scarce natural resources such as wells, pasture and land (Sundberg et al. 2012). It can be expected that climatic changes that further diminish the availability of these resources also increase tensions between groups that already today compete over resource access.

Indeed, a number of studies in different regions in Africa have found that more communal conflicts and riots take place in extremely dry periods (Hendrix & Salehyan 2012; Raleigh & Kniveton 2012; Fjelde & Von Uexkull 2012). There is also evidence from East Africa and in particular Kenya for wet periods being more likely to be followed or paralleled by communal conflict (Raleigh & Kniveton 2012; Theisen 2012; Witsenburg & Adano 2009). There is thus evidence for both particularly wet and particularly dry periods to be more conflict prone. Two explanations for the maybe unexpected link between wet periods and conflict seem plausible. Both drought and extreme rainfall could lead to a sudden drop in the availability of livelihood essentials, and thus lead to scarcity-related violence. For example, extreme rainfall may destroy crops and lead to flooding and landslides, which lead to destruction of property, infrastructure and migration (Tarhule 2005). Thus, evidence for linking rainfall shortages and excess to conflict could be due to the fact that despite being different meteorological phenomena, they have similar negative economic impacts.

An alternative explanation is that in times of abundance, violent conflict is both more feasible and profitable for groups involved in cattle-raiding, which often results in violent clashes (Meier et al. 2007; Raleigh & Kniveton 2012; Witsenburg & Adano 2009; Schilling et al. in this book volume). Instead of grievances due to scarcity, this explanation emphasises a tactical element in fighting. Notably, for most of the studies arriving at the conclusion that wet years are more dangerous than dry years, the focus is on East Africa, a region where pastoralist violence is very common. Due to a lack of information on the impact on agricultural output of the variations in rainfall studied, it is not possible to clearly favour one of these explanations.

Vulnerability and threat multipliers

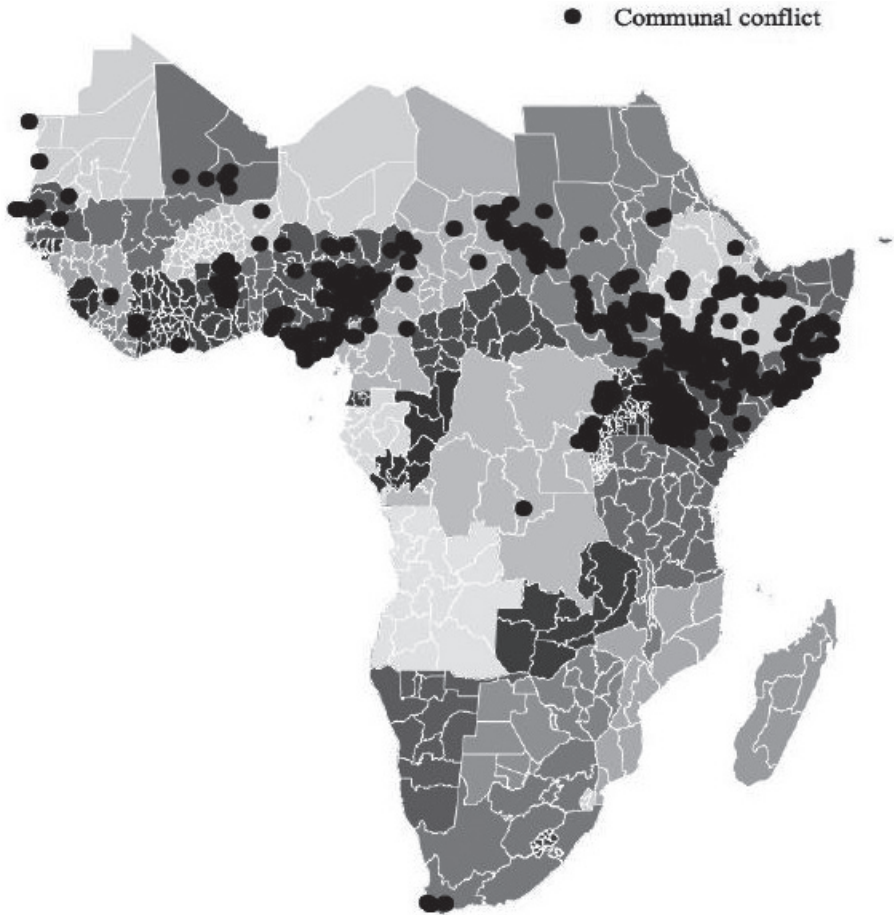
If there was a link between climate variability and armed conflict, and in particular communal conflict, which geographical areas and issues deserve most attention for con-

flict prevention and adaptation to climate change? As discussed above, there is more evidence for environmental factors driving conflict below the level of the state and in particular violence between communally-identified groups. So far, there has been little effort to systematically assess what factors make regions more prone to experience violence following climate variability. However, based on research on vulnerability to disasters (cf. Field et al. 2012; Sabaates-Wheeler et al. 2008) and the causes of armed conflicts (see Collier et al. 2003) a few crucial issues warrant attention.

Figure 1 displays the location of communal conflict in the 1990–2008 period and shows that this type of violence is clearly clustered geographically. Most of the conflicts take place in the Sahel zone. The Sahel is an ecological transition zone, spanning between the sands of the Sahara and the jungles of the Congo. It is characterised by fragile ecological conditions with semi-arid lands and irregular rainfall patterns (OECD 2006). The geographic concentration of communal conflict differs clearly from that of other types of conflicts. For example, a review of the UCDP Georeferenced Event Dataset data on intrastate conflict reveals that about only about a third of African intrastate conflicts are located inside the Sahel countries (Sundberg & Melander 2013). Thus, the Sahel appears to be both very vulnerable to the physical effects of climate variability and to see a certain type of organised violence, the dynamics of which in turn seem to be sensitive to climate variability. Hence, one likely indicator of vulnerability to climate-induced conflict appears to be the fragility of the physical environment.

However, vulnerability is more than exposure to a hazard and should include measures of social, economic and political factors that affect the ability of individuals and communities to absorb the impacts of hazard events and respond to crises (Füssel & Klein 2006; Field et al. 2012; Barnett & Adger 2007). The level of resilience to climatic shocks as well as conflict-propensity is shaped by the socio-economic resilience of population groups. Three factors appear to stand out in particular: the levels of political marginalisation and poverty, and a history of conflict.

First, as Raleigh (2010) points out, if a disaster hits an area, the extent of state government engagement in disaster mitigation measures will depend on the political status of the population groups affected. She argues that marginalised population groups will be disadvantaged with regards to disaster preparedness and mitigation measures, compared to groups that have access to government power. Second, political marginalisation may lead to structural conditions that make regions more conflict-prone. For example, Butler and Gates (2012) show that a lack of or biased property rights make conflicts between pastoralist groups over grazing land more likely. In this way the lack of a fair regulative state presence which could prevent or mediate disputes appears to increase conflict risk in an area (Barnett & Adger 2007). Third, climate-induced reduction in income and food are especially likely to fuel resentments when they have discriminatory impact on different population groups (Barnett & Adger 2007). The marginalisation of population groups is a factor that is very robustly linked to the outbreak of both intrastate and communal conflicts (Benjaminsen 2008; Fjelde & Østby 2012; Theisen

Figure 1: Communal conflict events 1990–2008

Caption: Map of Sub-Saharan Africa showing the location of communal conflict events in the 1990–2008 period from the UCDP GED dataset (Sundberg & Melander 2013).

2012). In sum, political marginalisation makes a group both more vulnerable to the adverse effects of climate variability and also more likely to engage in conflict.

Intimately linked to political marginalisation is the issue of poverty, which similarly shapes both conflict risk and vulnerability to climate variability (Raleigh 2010). Poverty reduces resilience to natural hazards as, for example, alternative sources of income are lacking (Sabates-Wheeler et al. 2008). At the same time, low income is one of the most robust correlates of armed conflict (Ward et al. 2010). Feelings of eco-

conomic deprivation may breed frustration and aggression, which facilitate recruitment for violence against other communities (Fjelde & Østby 2012; Kahl 2006; Gurr 1993). Poor individuals also have lower opportunity costs for participating in violence, since the income foregone when taking up arms and not engaging in regular economic activity is lower for the poorest (Collier & Hoeffler 2004). Therefore, it seems plausible that poverty may amplify adverse effects of climate variability and possibly also exacerbate conflict risk.

Lastly, regions might be trapped in conflict. On-going and past political instability and violent conflict bear high risk of continued conflict (Collier et al. 2003). The physical destruction and social cleavages resulting from earlier violent conflict also leave population groups more vulnerable to adverse effects of climate change (Smith & Vivekananda 2007), for example, due to the destruction of infrastructure and economic downturn (Field et al. 2012).

With long-standing traditional rivalries between communal groups over scarce natural resources, protracted civil war and renewed tensions looming, the Darfur region of Sudan is one of the textbook examples of this phenomenon. Located in the western periphery of Sudan; political, economic and physical vulnerabilities coincide in this region. The area was one of the regions that suffered the most from long and devastating droughts in the past decades which had a major negative influence on the vegetation and soil conditions (UNEP 2007). It also saw a general decline in long-term average rainfall (UNEP 2007). The income per capita in Darfur is much lower than the average on the continent and the region is politically marginalised (Brosché & Rothbart 2012). Some tribal clashes can clearly be linked to an increasing scarcity due to drought. For example, in October 1991 in a new wave of tribal fighting, several villages were burnt down and up to 50 people killed in Darfur when a severe drought had hit the population (The Guardian 1991). Areas like Darfur where poverty, political marginalisation and a legacy of conflict coincide with fragile ecological conditions appear therefore to be the most vulnerable to both natural disasters and are likely to experience armed conflict.

The way ahead: Implications for policy and research

While making considerable progress in recent years, this Chapter has demonstrated that there is little consensus regarding the circumstances under which climate variability may increase the risk of armed conflict. So where to go from here?

For academic research, this review of the state of the art in climate-conflict research shows that there is still no simple answer to the question of if and how resource abundance or scarcity resulting from climate variability heightens conflict risk. The discussion shows that more research is needed to study under what political, ecological and social conditions climate variability can be linked to conflict. The different determi-

nants of different types of armed conflict might account for the seemingly contradicting results that both abundance and scarcity can be related to armed conflict. For example, resource abundance (implying high vegetation and well-fed animals) has been shown to increase the risk of violent clashes in areas in the Horn of Africa where many pastoralist communities reside (Meier et al. 2007; Raleigh & Kniveton 2012; Theisen 2012; Witsenburg & Adano 2009). However, resource abundance might have a different impact on other communal livelihoods. Comparative studies of different types of communal conflicts seem necessary to disentangle causal mechanisms. It may be the case that pastoralist communities respond differently to climatic variability compared to groups which base their income on farming.

Apart from communal conflict, other forms of violence deserve attention. For example, the study of violence against civilians has been largely left out in previous studies (Gleditsch 2012). This is in contrast to the political relevance of this form of violence which has been very destructive in the past, as seen in the Rwandan Genocide in 1994 (Eck and Hultman 2007). Similarly, the study of distinct patterns of violence in urban and rural areas seems to be a fruitful approach (Gizelis et al. 2012). As Gizelis et al. (2012) argue, a rise in food prices due to climate variability may lead to social tensions in cities.

Moreover, conceptually climate variability could have different effects on the onset and dynamics of current armed conflicts. In particular, the onset of large-scale armed conflict is linked to considerable costly coordination and logistical problems. Once a conflict has started and fighters are equipped for fighting under the command of their leadership, these fixed costs have already been paid (Bazzi & Blattman 2014). So, perhaps the dynamics of ongoing conflict is more likely to be affected by climate variability, while climate variability itself does not lead to the outbreak of conflicts (Theisen et al. 2011). Lower opportunity costs to join in rebellion then could facilitate recruitment of rebels and thereby intensify fighting (Miguel et al. 2004).

For policy, the ongoing scientific debates about where and how climatic variability will affect conflict risk provide a number of implications. The dynamics of environmentally-influenced conflict might not yet be well enough understood to provide simple guidance for intervening actors. However, based on the present knowledge, a few factors need to be taken into account when targeting climate adaptation measures.

This Chapter has demonstrated that the linkages between climate variability and large-scale armed conflict are far from deterministic and, compared to other factors, the impact on civil wars, might be small. At present, there is little evidence for a direct short-term linkage between climate variability and the outbreak of civil wars in Africa (Gleditsch 2012; Theisen et al. 2011). In contrast, attention is warranted with regards to communal conflict. A clustering of communal conflict in the ecologically fragile Sahel region as well as initial evidence for both relative rainfall abundance and shortages to heighten the risk of violent contentions between communally-identified groups are indicators for the sensitivity of this type of violence to climatic changes.

However, after all, climate variability and extreme weather phenomena should not be seen in isolation from social processes. To blame the weather for violent conflict would be misleading, which the frequency of extreme weather phenomena and the rareness of conflict provide evidence of. Climate variability contributes to violent behaviour only in combination with social and economic factors. This leaves hope for successful conflict prevention. In many respects, addressing vulnerability to climate change and causes of armed conflict can be described as a no regret strategy that is beneficial even if the impact of climate variability on armed conflict turns out to be not as strong as asserted. Factors increasing vulnerability to natural hazards such as poverty and political marginalisation appear to also heighten the risk of armed conflict. Similarly, as political instability increases vulnerability of the population to environmental hazards, traditional peace-building measures at the same time increase coping capacities (Smith & Vivekananda 2007). Thus, as vulnerability to climatic hazards and causes of conflict overlap in many respects, any interventions that address these shared risk factors such as poverty and politico-economic marginalisation serve the double aim of climate change and conflict risk reduction.

However, a sensitive approach is warranted when the two aims of climate change adaptation or mitigation may be in conflict with conflict prevention. One example illustrating the dilemma is the building of hydroelectric dams in Northern Sudan. While being a source of carbon-free energy and thus beneficial from a climate change mitigation perspective, the construction of the dam ignited massive protests as it did not take into account the concerns of the local population. The government crackdown on protests left several people dead (International Crisis Group 2007). Thus, the impact of third party interventions for climate change mitigation and adaptation on existing social tensions warrants further research. This endeavour will be facilitated by recent efforts to map the sub-national patterns of aid allocation (e.g., Strauss Centre 2012).

Conclusion

In spite of making considerable progress in recent years, there is presently little consensus regarding many aspects relevant to the question under what circumstances climate variability might increase the risk of armed conflict. However, reviewing the latest advancements in this young field of research, a few key conclusions can be drawn.

First, not only resource scarcity, but also abundance of food, vegetation and income should be considered as potential conflict risks. The attention of researchers should be devoted to disentangle causal mechanisms that explain the two linkages between rainfall shortages and conflict as well as rainfall abundance and conflict shown. Second, communal conflict seems to be to a greater extent affected by climate variability than intrastate conflict. A concentration of communal conflict in the Sahel region warrants both the attention of climate change adaptation interventions and further research in the climate-conflict relationship. Third, it has been shown that vulnerability to climate

variability and causes of armed conflict overlap in relation to poverty, political marginalisation/inequality and a legacy of conflict. Regions where these risk factors coincide should be prioritised in disaster risk reduction and conflict prevention efforts.

Acknowledgements

Financial support by the Swedish Centre for Natural Disaster Science (www.cnds.se) is gratefully acknowledged. I also thank the editors and Nynke Salverda for valuable comments.

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Food policy and civil war in Africa's drought-suffering states

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Abstract

Extreme weather events such as drought are thought to increase the risk of violent civil conflict, especially in areas that are prone to severe food shortages. Global climate change is predicted to raise the frequency of such scarcity-inducing events in sub-Saharan Africa, so it is important to understand which food policies most successfully stabilise African societies in times of drought. Here, we examine various food policies African states might pursue, giving special attention to those that boost domestic food production and those that increase reliance on imported foreign-grown food. We find that the success of these food policies is dependent upon a state's level of adaptive capacity. Where states possess the capability to secure and distribute imported food, imported food can greatly reduce the risk of major civil war during times of severe drought. However, in Africa's weaker states imported food does not reduce the risk of drought-induced conflict, likely due to an inability to distribute food imports before they are stolen by corrupt leadership or seized by militant groups. In these weaker states, boosting domestic food production substantially decreases the risk of drought-induced conflict.

Keywords: drought, civil war, Africa, food policy, adaptation

Introduction

Presently, one in three people living in sub-Saharan Africa is severely malnourished. The number of malnourished people in the region nearly quintupled between 1996 (44 million) and 2009 (212 million), and this hunger epidemic has resulted in worsening rates of infant mortality, child stunting, and scarcity-induced political violence (Knight 2011; UN 2010). This humanitarian tragedy is not the result of neglect. Sub-Saharan food insecurity is being countered by extensive international efforts to bring more food into the region, and many African governments have increased domestic food production with hopes that higher yields and greater agricultural efficiency could mitigate the tragic social consequences of prolonged food insecurity (FAO 2011; UN 2010).

Climate change impacts on the frequency and severity of drought and heat stress will increase food insecurity via reductions in yield, crop failure, and reduced livestock productivity (Easterling et al. 2007). As adequately addressing chronic food insecurity proves to be very costly, it is important to compare the relative effectiveness of the various adaptation strategies that are used to reduce food insecurity and lessen the likelihood of scarcity-induced violence. Financial resources for adaptation plans are limited in sub-Saharan Africa. Therefore, effective climate change adaptation will

require cost-efficient policy and sensitivity to contextual factors that influence the effectiveness of adaptation strategies. This Chapter explores this issue by examining how well increases to foreign-grown food and increases to domestically-produced food reduce the risk of civil war during drought in sub-Saharan Africa.

Our analysis uncovers evidence to suggest that there is no single food policy that optimally reduces the risk of civil war in all African contexts. Foreign-grown food and domestically-produced food affect the propensity for major civil war very differently, and attention to these differences is imperative for successful and peaceful climate change adaptation. Increased levels of foreign-grown food are ideal in some contexts while heightened domestic food production is essential in others. Whether foreign food or domestically-produced food better pacifies drought-afflicted regions depends in large part upon *state adaptive capacity*, here defined as the government's ability to govern following an environmental crisis (see Adger 2006; Barnett & Adger 2007; Burton 1997; Smit & Pilifosova 2001). States with high adaptive capacity can manage crises with legitimacy, efficacy and transparency. The social and political outcomes of increased environmental scarcity are very different in these states relative to those in weak, low-capacity states where corrupt and incapable government is the norm. Scarcity affects these states differently, and so too do different food adaptation strategies. A state's level of adaptive capacity should be a primary consideration in the formation of adaptation programmes aimed toward reducing African food insecurity during times of drought.

Below we outline and test a novel theory linking state adaptive capacity, policies for addressing food insecurity, and the likelihood of major civil wars that result in more than 1 000 battle deaths. We differentiate between two broad types of food policies: those that focus on increasing access to foreign-grown food and those that emphasise domestic food production. These categories are necessarily inclusive, and further research that more closely parses out specific policies within these categories is encouraged. Nonetheless, a number of interesting patterns emerge. Our analysis finds that increasingly foreign-grown food reduces the probability of major civil war onset only in the few African states with the highest levels of adaptive capacity. For much of the continent, imported foreign-grown food fails to increase the prospects for peace. In weaker states with lower levels of adaptive capacity, achieving high levels of domestic food production can help states maintain peace and avoid major civil war.

The Chapter is outlined as follows. The next section explicates the argument with greater precision and offers some reasons one might expect adaptive capacity to condition the relationship between food adaptation policy and the risk of major civil war. Food distribution is the central causal mechanism in our argument, and we illustrate its importance with some *prima facie* evidence from the recent conflicts in the Sudan. The argument is then tested with a cross-national quantitative analysis of drought and civil war for all African countries for which data is available over the years 1960–2002.

The conclusion suggests avenues for future research and highlights implications for climate change adaptation plans in the sub-Saharan region.

Adaptive capacity, food policy and civil war

This section outlines a conditional theory that links the risk of drought-induced civil war to food security policies and a state's level of adaptive capacity. A state's capacity to adapt to crises dictates – at least in part – the efficacy with which food can be used to mitigate a scarcity-induced crisis in which civil war might occur. Adaptive capacity describes a government's ability to manage crisis and maintain order following a scarcity-inducing event (see Brooks et al. 2005). Previous research links adaptive capacity to a number of contributing factors, including ethnic homogeneity (Besançon 2005; Bogale & Korf 2007; Kahl 1998; 2006; Raleigh 2010), the absence of government corruption (Benjaminsen 2008; Williamson et al. 2012), pre-existing access to basic services such as health care (Brooks et al. 2005), the wealth of the state (Adger 1999; Bohle et al. 1994), access to markets for sale of produce (Joshi et al. 2006), and the accessibility of rural communities via roads (Dercon et al. 2008). Where stable states and favourable conditions ease the government's ability to respond to a crisis, as in Botswana, adaptive capacity is thought to be relatively high (see Reardon & Taylor 1996). In the DRC conditions would lead one to expect that the state is ill-prepared for crisis. Here, adaptive capacity is relatively low. Adaptive capacity is often equated with state strength in the academic literature on the topic, and social vulnerability is the inverse of adaptive capacity. For our purposes, these terms are interchangeable. States with *high adaptive capacity* are *strong* and have *low vulnerability* to war. *Low-capacity states* are *weak* and have *high vulnerability* to war.

A state's level of adaptive capacity should affect the efficacy of food policy in a number of ways, and our argument focuses on issues related to distribution. States with low adaptive capacity lack vital institutional and physical infrastructure, and this impedes their ability to distribute food and other important goods in times of humanitarian crisis. Government corruption may lead to policymakers directing any food they control only to their own ethnic supporters or selling food to the wealthiest members of a vulnerable population (see Benjaminsen's 2008 discussion of Mali and Habyarimana et al. 2009). Insufficient transportation infrastructure complicates the logistics of food distribution and poses a formidable obstacle to effective conflict management (Buhaug & Rød 2006; Fearon & Laitin 2003). Low-capacity governments are likely to be too weak to secure the goods they possess, and this makes these goods vulnerable to theft and redistribution by militant groups. As seen recently in the Horn of Africa, stolen goods can then be used to recruit militants to further undermine state control in crisis zones (Amnesty International 2011). In this way, state adaptive capacity is closely related to the distribution of goods during a crisis. Where adaptive capacity is high, governments are more likely to overcome these challenges and distribute goods

effectively. Where adaptive capacity is low, these distribution problems are likely to thwart the government's efforts to manage an environmental crisis.

This distribution argument holds important implications for climate change adaptation programmes in sub-Saharan Africa, especially with regard to food policy. Foreign-grown food that is brought into the country – be it free food aid or subsidised food imports – enters at strategic ports and transit hubs and is then distributed throughout the country. The burden of distribution is generally shared by international distributors (aid groups, NGOs, etc.), businesses, and African governments. From the initial point of entry to the final recipient, these goods are vulnerable to theft, banditry, corruption, and selective redistribution. We provide support for these claims in the discussion of Sudan in the following section.

Distribution problems are less severe for food produced domestically. Where food is grown in the immediate vicinity, it is dispersed throughout agricultural areas and access to food is more removed from the central government. Subsistence farmers can store their own grains, reach their own community-level crisis management plans, and forego many of the logistical problems that can undermine the efficacy of foreign-grown food. Examples of local storing and resource sharing are abundant in the Sahel region and have been the focus of some recent research in Ethiopia (see Bogale & Korf 2007). The distribution of domestically-produced food is not seamless, but the fact that it is more widely dispersed and less contingent on government efficiency makes it less susceptible to corrupt distribution and militant banditry.

Figure 1: Conditional theory of food policy and civil war



The implications for drought-time food policy are illustrated in Figure 1. Among states with low adaptive capacity (bottom quadrants), the distribution problem creates an important difference in the efficacy of foreign-grown and domestically-produced food. Foreign-grown foods are more subject to the distribution problem, so the weaknesses that afflict low-capacity states dampen the effectiveness of imported food. Government corruption increases the likelihood of selective distribution that can create social motivations for violent group conflict. The inability to secure food along transit routes renders governments susceptible to attacks from rebel organisations. For these reasons, foreign-grown food is not expected to reduce the risk of civil war in drought-afflicted low-capacity states. In fact, it could possibly increase the probability of civil war onset.

In states with low adaptive capacity, domestically-produced food is more likely to promote peace and stability. With less severe distribution problems and less reliance on an incapable central government, vulnerable populations are more likely to have sufficient access to this resource. Therefore, given the same amount of food, domestically-produced food is likely to promote food security (and reduce the risk of scarcity-induced violence) more effectively than imported foreign-grown food.

The distribution problem is not as serious in states with high adaptive capacity (upper quadrants in Figure 1). By definition, these states are better able to manage crises and maintain the ability to secure and distribute goods effectively. The ability to distribute makes domestic food production less vital. These states can compensate for low domestic food production with successfully secured and distributed foreign-grown food. This implies international food aid and food imports can effectively reduce food insecurity and the risk of violent conflict in states with high adaptive capacity.

Thus far, this argument has been made in a linear manner with the idea of distinct items interacting with one another, for example, if a state has high adaptive capacity, when a drought occurs, a conflict does not occur. Reality is rarely this linear though, and it is clear that drought, food insecurity and violent unrest operate in a much more complex manner, with feedbacks reinforcing existing conditions (Messer 2009). For instance, states with higher adaptive capacity are likely to maintain higher levels of food production during prolonged droughts, and the availability of adequate food stores over time could influence the capacity of the state. Persistent drought should weaken adaptive capacity (see Miguel et al. 2004). States with persistently low adaptive capacity may be less able to produce food. Below, we examine these relationships further in the following case study that explores food policies as they interact with political instability during the long drought in Sudan.

Food distribution and conflict in drought-stricken Sudan

A series of conflicts in Sudan typifies the distribution problems caused by foreign-grown and domestically-produced food in a state with low adaptive capacity. In Darfur, violent conflict has compounded the effects of drought cycles by limiting access to both domestic and foreign food sources. On individual and organisational levels, violence and instability undermined coping mechanisms and adaptive strategies: people driven from their land by rebel groups could not cultivate agricultural products and international aid organisations struggled to distribute food imports to large areas of Darfur. Jaspars and O'Callaghan (2010) describe the interconnected relationships between looting, interrupted social services, restricted internal movement, and inhibited livelihood capabilities. Threats to food aid relief operations originated from both government-backed militias and anti-government rebel factions during the peak of the crisis between 2006 and 2008.

Decades of fighting between the government of Sudan and south Sudanese rebels weakened the state's adaptive capacity to drought. As conflict diminished domestic production, food imports provided by international aid operations became a valuable resource for all parties in the war. While government forces effectively restricted access to relief and failed to secure transport, rebels used stolen aid to recruit fighters and sustain conflicts with the government. During the famine in 1988, both government units and Sudanese People's Liberation Movement/Army (SPLM/A) fighters restricted access to food and foreign aid supplies in vulnerable southern territories, resulting in the death of approximately 250 000 people and the displacement of nearly three million more (Flint & de Waal 2008; Meredith 2005). The longevity of the civil war increased the scale of Sudanese dependency on international food aid and perpetuated this cycle of banditry, insecurity and warfare.

The second phase of the North-South Sudanese civil war (1983–2005) precipitated future conflict in Darfur (see Flint & de Waal 2008; Pruniér 2007). Intense fighting between the SPLM/A and government forces concentrated in the Blue Nile, Bahr al Gazal, Kordufan and Khartoum regions. Violent insurgency against the Sudanese regime earned the SPLM/A more political attention and power, relative to other groups throughout the rest of Sudan, especially Darfur. Keen and Lee (2007) attribute the sense of marginalisation to the exaggerated impacts of drought cycles due to the instability caused by decades of fighting. Straus (2005) discusses the escalation of antagonisms during this time among Darfur's 'black' African tribes and Muslims as land and water resources became scarce following severe drought cycles. As a continuation of its counterinsurgency strategy in South Kordufan, Khartoum armed and supported proxy Arab militias in Darfur; many non-Muslim tribes considered the militarisation of the Janjaweed a significant security threat (Nurain 2008). The 2005 Comprehensive Peace Agreement between the government and the SPLM/A ignited these aggravated grievances for two emerging groups in Darfur: the Justice and Equality Movement (JEM) and the Sudanese Liberation Army (SLA). As rebel attacks on government outposts in

Darfur continued, so did Khartoum's support for the Arab militias. During the ensuing conflict, ethnic factions strove to repossess pastoral lands cultivated by rival groups. A 2007 analysis of food insecurity and vulnerability crises in Darfur reported that an estimated two million people were internally displaced by violence and banditry in the region (Rivers et al. 2007).

Agricultural production is the primary livelihood strategy for 26.4 million Sudanese (FAO 2011). Somewhat remote from heavy grain-producing Central and Eastern Sudan and lacking in sufficient infrastructure, Darfur had little access to food markets outside of the region (Young et al. 2005). Massive internal displacement occurred throughout Darfur because the conflict resulted in a vast reduction of domestic food sources. Because of its distance from Sudan's primary agricultural regions, domestically-produced grain suffered some of the same distribution problems seen with imported foreign-grown food. Conflict permeated through community networks that safeguarded pastoral claims and facilitated livelihood diversity. Kinship networks were similarly undermined during the conflict. The prevalence of female-headed households, for example, increased problems of resource insecurity. The 2006 Sudan Household Health Survey (SHHS) reported that female-headed households in Darfur were 10% more likely to be food-insecure than male-headed households (Rivers et al. 2007).

Localised shortages spread through human migration. Refugees displaced by the conflict were forced to homogenise their livelihood strategies and rely on international food aid. Data from the SHHS confirms this trend in north and west Darfur. By 2006, 20% of west Darfur households relied exclusively on imported food assistance, while nearly one-third of north Darfur reported receipt of internal aid (Rivers et al. 2007). Given the long conflict's deleterious effect on the central government's adaptive capacity, foreign aid and food imports were even more susceptible to government corruption and rebel seizure. Weak state control provided opportunity for attacks on foreign aid workers transporting food and other goods into conflict-affected areas, forcing humanitarian withdrawal from large areas of Darfur. UN programmes in all three Darfur states maintained limited access to in-need populations during the peak of the Darfur conflict; in some cases, food aid successfully reached only 64% of the population (US Department of State 2007).

While the transportation of food aid had been problematic since the beginning of the Darfur conflict in 2003, between 2007 and 2009 the ability of the World Food Programme (WFP) to distribute food aid diminished substantially. As early as December of 2007, the WFP (2008a; 2008b) reported that over 100 000 people could not be reached at all by aid transports. The escalation of violence against humanitarian workers forced a number of private contractors to suspend their operations, which reduced monthly carrying capacity by 15 000 – 20 000 tonnes of food – almost half of what was needed for all of Darfur (WFP 2008a). By the end of spring 2007, the UN Office for the Coordination of Human Affairs (OCHA) reported 113 hijackings of foreign aid transports since January, resulting in the deaths of seven humanitarian aid work-

ers and the estimated theft of 709 tonnes of food (WFP 2008a). Later, the WFP announced it would reduce rations to 1 242 kilocalories/person/day – a reduction of almost 40% – because of diminished warehouse supply and limited transport options (WFP 2008a). Because large proportions of households in Darfur relied on imported food aid at the time, decreases in the volume of WFP food transports from 2007–2009 resulted in significantly limited access to food for hundreds of thousands of internally displaced persons in Darfur.

While international aid has been beneficial for recipients (Buchanan-Smith & Jaspars 2007), it has also created a series of perverse effects. Prior to the outbreak of conflict, Darfurians maintained diverse livelihood practices comprised of farming and raising of livestock in addition to trade and migrant labour (Young et al. 2005). For large numbers of Sudanese, the devastation of these practices during conflict resulted in greater food insecurity and dependency on imported food assistance. In their discussion of conflict economies and refugee impacts, Alix-Garcia et al. (2012) conclude that imported food assistance in newly urban refugee communities raises local prices at the expense of consumers. While they report some beneficiaries of the price changes, the continued reliance on imports sustains vulnerability to supply shocks in most demographic groups. Rebels and government-supported militias each have strategically targeted domestic and foreign food sources in order to weaken their opponents and strengthen their own fighters. In addition, the continued dependency on foreign aid gives the government little incentive to improve agricultural practices and return attention to marginalised groups living in the Sudan.

The Darfur case provides persuasive *prima facie* evidence for the conditional relationship between a state's level of adaptive capacity, food policy and civil war onset. With greater adaptive capacity, the government of Sudan might have been able to better overcome the distribution problems discussed above. The conflict may have been resolved earlier had the government had the strength and willingness to secure imported food, reduce banditry and rebel recruitment, and undercut support for rebel organisations. To determine whether this conditional relationship can be generalised to the rest of the sub-Saharan subcontinent, we proceed with a cross-national quantitative analysis. The analysis presented below offers robust support for our argument and suggests that the stabilising effects of food production and food imports are conditioned by a state's level of adaptive capacity.

Quantitative analysis

We test our argument empirically with a cross-national analysis of drought-time civil wars in more than 40 sub-Saharan states for the period beginning January 1960 and ending December 2002. Distribution problems face states whether an environmental crisis is present or not, but the close relationship between food policy and civil war

should be most evident during severe droughts. For this reason, the sample of cases is limited to only those country-month observations that are suffering an unusually severe drought event.

We identify periods of severe drought by using drought severity data from the United States National Centre for Atmospheric Research. The Palmer Drought Severity Index is sensitive to a number of factors that affect soil moisture; including rainfall, ground surface temperatures and stream flow (Palmer 1965; 1968). Relative to alternative drought measures that only account for extreme variation in precipitation (see, for example, Hendrix & Salehyan 2012), the index more accurately captures the broader range of conditions that drive drought (see Dai 2011 and Dai et al. 2004 for coding information). These monthly drought scores are available on a 2.5 degree latitude by 2.5 degree longitude grid that covers the entirety of the sub-Saharan African landmass. We aggregate these data to the country level-of-analysis so that each country in the sample receives a unique measure of drought severity for every month in the 1960 to 2002 period. The analysed sample of cases includes only those country-months where drought is more severe than the mean country-aggregated drought severity score.

Adaptive capacity is an elusive concept that is not directly observable, but a large literature on the topic names its most important correlates. Here, we generate a monthly state Vulnerability Score that accounts for variation in the primary determinants of adaptive capacity. Adaptive capacity and vulnerability are inversely related so that a high Vulnerability Score indicates low adaptive capacity. The determinants of the score include population size; urbanisation; mountainous terrain; per capita GDP; regime type; the history of conflict in the country; the durability of government institutions; and ethnic, religious and linguistic diversity. For every country-month, these variables are used to predict the ex-ante likelihood of civil war. The predictions generated by this model become the Vulnerability Score. While this is not a direct measure of a state's ability to adapt to environmental crisis (this is an unobservable concept) it is a valid approximation of adaptive capacity because states with low levels of adaptive capacity are also the most likely to suffer war regardless of drought conditions.¹

The Vulnerability Score identifies states like the DRC/Zaire in the 1990s and Ethiopia in the 1980s as some of the observations with the lowest levels of adaptive capacity in this time period. Here, the ex-ante risk of civil war onset was estimated to be as high as 6%. These countries suffered recent conflict, had new and incapable governments, and endured poverty and unfavourable demographics. States like Botswana rank among those with the highest adaptive capacity. Adaptive capacity can change rapidly during times of regime turnover and economic shock, and this monthly measure is uniquely responsive to these short-term changes. It improves gradually with

1 Space considerations prevent the inclusion of the entire estimation procedure in this paper. For more information on the statistical techniques used to estimate the Vulnerability Score, see Bell and Keys (2012).

economic growth and political stability, but worsens dramatically following political turnover and turmoil.

We measure domestic food production and imported foreign-grown food with information from the database of the FAO (2011). Cereal comprises the majority of the diet for most Africans, but the specific cereals consumed vary across this expansive region. We account for sub-regional variation by adopting the FAO's measures of annual Total Cereal Production and Total Cereal Imports. The included staple cereals are barley, buckwheat, canary seed, fonio, maize, millet, oats, popcorn, quinoa, rice, rye, sorghum, triticale and wheat. We calculate the numbers on a per capita basis and log these values to obtain scaled measures of food production and food imports per resident. Additionally, we transform these variables into a ratio of Cereal Import Dependence, which provides the share of each state's total cereal supply that is comprised by imported foreign-grown cereal. These values are interacted with the Vulnerability Score to test our hypothesised conditional relationship. Food data are annual and are not sensitive enough to capture short-term changes in food availability. However, these annual data do offer an adequate sense of the origins of food present in a country before and during times of severe drought.

Table 1: Models of drought adaptation

		<u>Coef.</u>	<u>Std. Err.</u>	<u>p-Value</u>
Model 1	<i>Cereal Produced</i>	-0.046	0.257	0.857
	<i>Vulnerability</i>	234.186	106.044	0.027
	<i>Vulnerability*Product</i>	-30.736	23.377	0.189
	<i>Constant</i>	-6.020	1.189	0.000
	<i>N: 8850 Wald Chi-Squared: 32.67</i>			
Model 2	<i>Cereal Imported</i>	-0.384	0.211	0.068
	<i>Vulnerability</i>	-106.907	197.012	0.587
	<i>Vulnerability*Imports</i>	67.782	65.203	0.299
	<i>Constant</i>	-5.031	0.634	0.000
	<i>N: 8850 Wald Chi-Squared: 25.14</i>			
Model 3	<i>Import Dependence</i>	-0.399	1.199	0.739
	<i>Vulnerability</i>	58.778	29.132	0.044
	<i>Vulnerability*Depend</i>	205.277	97.547	0.035
	<i>Constant</i>	-6.186	0.370	0.000
	<i>N: 8850 Wald Chi-Squared: 38.19</i>			

All models are complementary log-log general estimating equations with country-clustered standard errors. Because terms are interacted, statistically insignificant coefficients do not mean significant statistical relationships are present.

Major civil wars (> 1 000 deaths) are very rare events, and we identify the starting and ending months of these wars with data from the Correlates of War project (see Sarkees and Wayman 2010). Standard control variables in civil war models are included in the preliminary estimation of the Vulnerability Score, so we do not include them a second time in our estimation of the effects of food policy during drought. In Table 1, we present the results related to the Vulnerability Score, food policy, and the interaction term (Vulnerability*Policy) that tests to see whether the effect of food policy varies with a state's level of adaptive capacity. As the regression results are in log odds that are not intuitively interpreted, we discuss the implications of the findings with three figures.

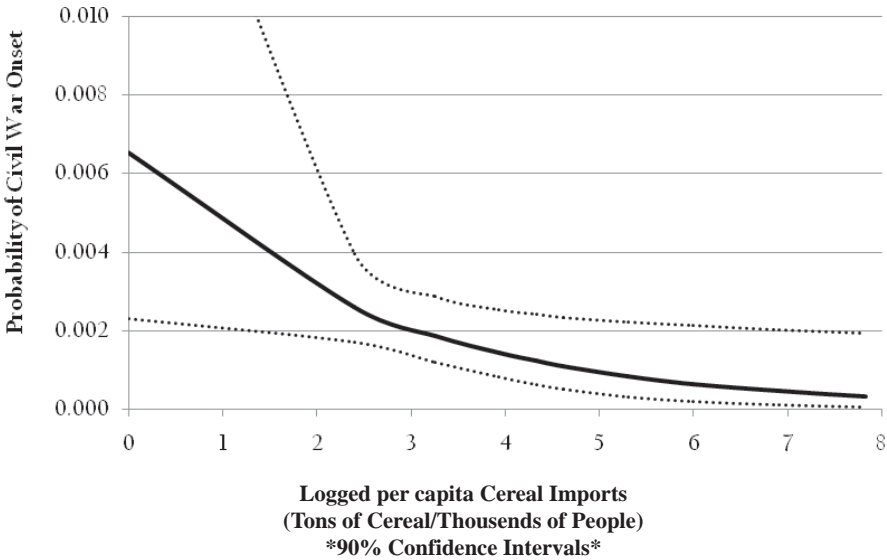
Figure 2 shows that domestic cereal production improves the prospects for peace in some drought-afflicted states. The negative correlation between cereal grain production and the risk of war is greatest where states have the least adaptive capacity. By increasing per capita cereal production by one standard deviation, these states can reduce the risk of civil war by as much as 75%. Even among states with moderate adaptive capacity, those that maintain high per capita cereal production are ten times less likely to suffer civil war relative to those producing the least cereal per capita. As predicted, cereal production does not mitigate the destabilising effects of drought in more stable states. The risk of civil war initiation is low regardless of food production, and we attribute this result to these states' capacities to compensate for low production with effectively distributed foreign-grown cereal.

Figure 2: The effect of domestic cereal production on civil war initiation in drought-suffering states



This claim is supported by Model 2, which evaluates whether importing foreign-grown cereals can reduce the risk of major civil war during severe drought. The results of the test suggest cereal imports and cereal production have very different effects on drought-suffering states. Whereas the domestic production of cereal pacifies sub-Saharan states with low adaptive capacity, cereal imports do not reduce the likelihood of civil war onset in these states during periods of severe drought. Even among states with moderate levels of adaptive capacity, imported cereal does not reduce the risk of civil war. These findings offer some support for our argument and highlight the substantively important difference between cereal production and cereal imports. If the goal of adaptive policy is to bring peace and stability to states suffering from drought, these policies may be more effective if they are centred on improving cereal yields rather than increasing reliance upon imported foreign-grown food.

Figure 3: Cereal imports and civil war initiation in high-capacity drought suffering states

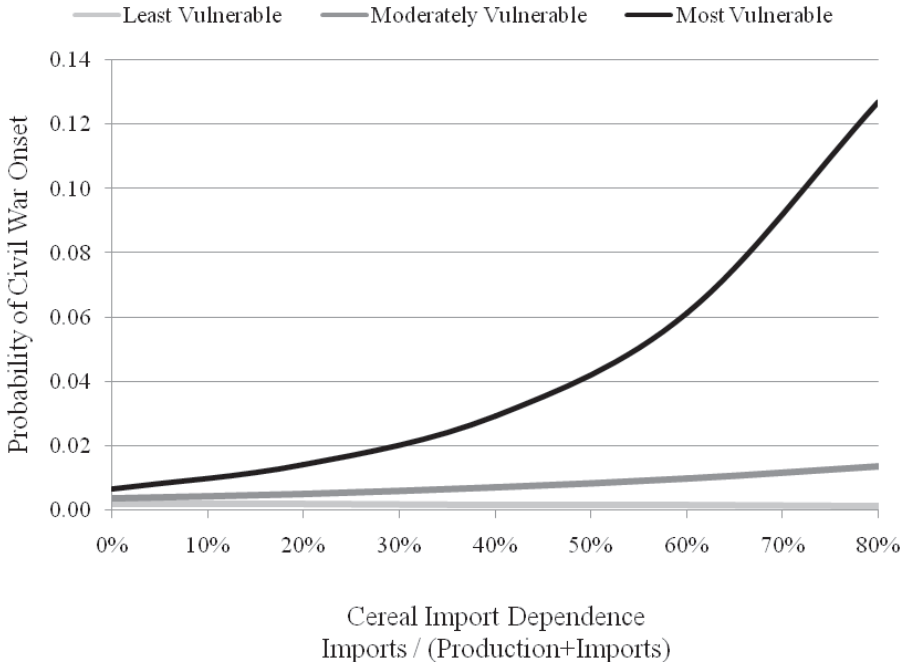


Only the strongest sub-Saharan states are more stable with foreign-grown cereal during drought (Figure 3), and we attribute this fact to good governance and effective infrastructure. Where vulnerability to conflict is low, political institutions are more enduring, regimes are more stable, and economies are more developed. Consequently, these regimes are better able to distribute imported cereal and prevent hostile groups from disrupting food distribution. Recent interactions between foreign aid workers and al Shabab fighters in Somalia (Amnesty International 2011) and our discussion of Darfur illustrate how a state's inability to distribute foreign-grown food can inhibit the effectiveness of foreign-grown food during drought.

While imports have a robust pacifying effect on the sub-Saharan states with the greatest levels of adaptive capacity, the substantive importance of this effect is relatively small. These exceptionally stable states are at a decreased risk of scarcity-induced conflict regardless of food imports, and there are also diminishing returns to increased cereal imports. Increasing per capita cereal imports from 0 to 50 tonnes per 1 000 people results in an 80% reduction in the risk of civil war. Quadrupling imports further to 200 tonnes per 1 000 people decreases the risk of civil war by an additional 40%. The implication of this diminishing return is that relatively stable states that import little cereal can effectively reduce the likelihood of drought-time war by increasing imports. However, the marginal gains associated with increased cereal imports are much smaller for those states that already import a large amount of foreign-grown cereal.

We test the robustness of these results by examining Cereal Import Dependence, which is the ratio of cereal imports to total cereal supply (imports and production). Where states can effectively manage and distribute imported cereals, the share of cereal that is imported should not predict the likelihood of civil war onset. However, import dependence should be linked to a greater risk of civil war onset in weaker states that lack the transparency and adaptive capacity necessary for the effective distribution of foreign-grown grains. We test these predictions in Model 3 and the results complement those produced by Models 1 and 2 (see Figure 4). Cereal import dependence does not increase the risk of conflict in drought-afflicted states with high adaptive capacity. Rather, cereal import dependence is destabilising only for those states that are more vulnerable to drought-induced conflict. Where import dependence is lowest (imports comprise less than 10% of the cereal supply), the risk of war breaking out in states with low adaptive capacity is less than 1%. If import dependence in these states rises to 60%, the risk of civil war increases to 6%. States with the greatest import dependence (80%) face a 12% probability of civil war initiation within a month. First difference testing confirms the robustness of this result. Amongst the African states with the least adaptive capacity, the risk of drought-induced civil war rises precipitously with a state's dependence on imported foreign-grown cereal.

Figure 4: Cereal import dependence and civil war onset in drought-suffering states



Conclusion

In order to contribute to conflict-sensitive climate change adaptation policy, research and practice; we presented and tested a conditional theory of food security and drought-induced civil war in the sub-Saharan context. We argued that the efficacy of food production and food imports will depend upon a state's level of adaptive capacity, and a case study of Darfur and cross-national statistical analysis provided support for this claim. Specifically, the study demonstrates that increases of imported foreign-grown food are not correlated with a lower risk of civil war in most African states. Because foreign-grown food is more vulnerable to ineffective and incapable government institutions, this food reduces the risk of war only in the African states with the highest adaptive capacity. Efforts to boost domestic food production, especially in the weaker African states, are more likely to result in lower frequencies of drought-induced civil wars.

While our findings support our causal argument, future work could focus on more closely examining the mechanisms linking distribution problems to food insecurity and civil war onset. It is possible that a lack of infrastructure inhibits distribution, or that corruption makes the prices of cereal grain imports unaffordable to rural communities. Understanding the underlying reason for this result could help to alleviate the distribution problem and reverse the unfortunate effects of cereal grain imports on drought-induced conflict. This would be particularly important to those nations that are unable to expand domestic grain production due to non-climatic limitations (for example, lack of additional arable land). These results suggest that a reformed, context-sensitive approach to food policy is warranted, and further study of this topic will serve to maximise the efficiency of these policies and increase food security in the future.

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Livelihood security: Climate change, migration and conflict in the Sahel

Dennis Hamro-Drotz

Abstract

Climate change is a threat-multiplier, exacerbating vulnerabilities and changing the distribution and supply of natural resources. Dubbed 'ground zero' for climate change due to its extreme climatic conditions and highly vulnerable population, the Sahel has for decades faced considerable population growth, pervasive poverty, food insecurity, and chronic instability. Through changes and variability in temperature and rainfall, and the occurrence of slow and rapid onset disasters, climate change is predicted to lead to food and water insecurities, greater scarcity of natural resources, increased competition over those resources, and loss of livelihoods. This is particularly true for livelihoods such as farming, fishing and herding of livestock that are the most vulnerable to climate changes. These livelihoods have long adapted to high rates of climate variability, using migration as one traditional adaptation approach. With most of the population of the Sahel directly dependent on natural resources for livelihoods, the predicted impacts of climate change for resource availability and food security in the region could be dramatic. This Chapter is based on a larger study of the region*. It uses maps to describe the historical climate trends in the region, and outlines how these changes can contribute to either voluntary or forced migration, as well as conflict between or within communities and livelihood groups. Recommendations for improving conflict and migration-sensitivity in adaptation planning, investments and policies across the region are provided.

Keywords: Climate change, conflict, migration, Sahel, livelihood security, policy

* This Chapter is a synthesis of, and is entirely based on a joint study and report of the same name, by the United Nations Environment Programme (UNEP), the International Organisation for Migration (IOM), the UN Office for the Coordination of Humanitarian Affairs (OCHA), the United Nations University (UNU), the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) and technical inputs provided by the University of Salzburg's Centre for Geoinformatics. Dennis Hamro-Drotz was one of the key authors of that report.

Introduction

'Competition between communities and countries for scarce resources, especially water, is increasing, exacerbating old security dilemmas and creating new ones, while environmental refugees are reshaping the human geography of the planet, a trend that will only increase as deserts advance, forests are felled and sea levels rise' (UN 2011: 2). This statement by UN Secretary-General Ban Ki-moon during the July 2011 debate on climate change and security in the UN Security Council, underscores the need

to assess the implications of climate change for conflicts and environmentally-induced migration.

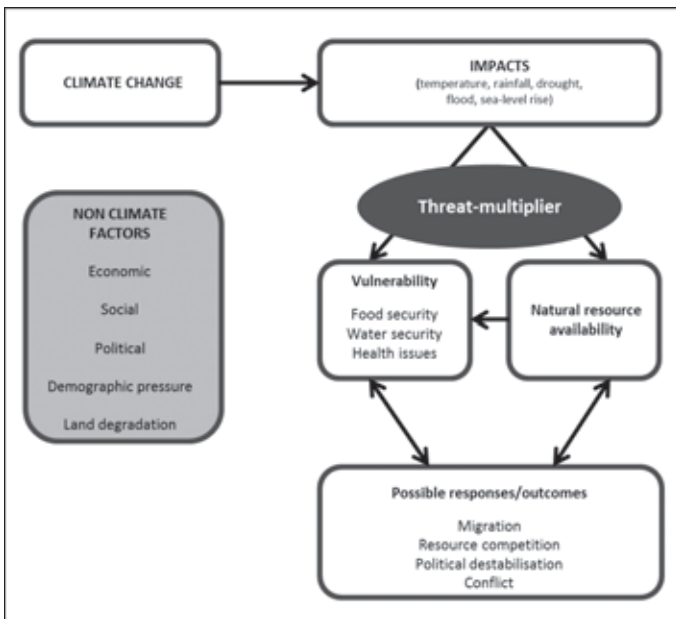
This is particularly true for areas that are considered especially vulnerable to the effects of climate change, one of them being the Sahel area in sub-Saharan Africa. The Sahel is dubbed 'ground zero' for climate change due to its extreme climatic conditions and highly vulnerable population (IRIN & OCHA 2008). Three key areas of particular concern have been highlighted by the UN Secretary General's Special Advisor on Conflict, Jan Egeland, following deployment to the Sahel region: (i) the threats posed by the potential impacts of climate change for livelihoods, in particular for livelihoods that are dependent on natural resources, such as farming, fishing and herding; (ii) increasing migration pressures due to disasters, conflicts and the associated loss of livelihoods; and (iii) escalating tension and potential conflicts over increasingly scarce natural resources, coupled with the availability of small arms and light weapons (IRIN & OCHA 2008).

While underscoring the need for greater investment in climate change adaptation, these findings called for further research and analysis on historical climate trends in the region, in order to understand how livelihoods have been affected, what coping mechanisms have emerged and the potential impacts of changes in the regional climate for conflict and migration. The report that this Chapter is based on, titled *Livelihood security: Climate change, migration and conflict in the Sahel* answers this call (UNEP et al. 2011). The report and this Chapter focus on the nine Sahelian countries that are members of the CILSS, including Burkina Faso, Cape Verde, Chad, the Gambia, Guinea-Bissau, Mali, Mauritania, Niger and Senegal. Given the nature of migratory patterns and economic trade in these countries, eight neighbouring members of the Economic Commission of West African States (ECOWAS), outside of the Sahel region, were also included: Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria, Sierra Leone and Togo. As the study and this Chapter do not cover all the countries of the Sahel, 'the region' refers to the 17 countries identified above.

The findings and recommendations are based on a mapping exercise analysing climate trends over a 24 to 36-year period in the 17 countries included in the study. The maps focus on four climate indicators based on the best available data: rainfall (1970–2006), temperature (1970–2006), drought occurrence (1982–2009), and flooding occurrence (1985–2009). The potential impact of projected sea level rise in the region is also mapped. The data is then combined to identify potential 'hotspots', including areas where the most extreme changes in the four individual climate indicators have taken place, as well as areas where the most cumulative change of these four climate indicators have occurred. Population trends and conflict occurrence during the same time periods are also featured on separate layers. Secondary sources and case studies are used to explore challenges to the livelihoods of people in the region in relation to the observed climate trends, to explore how these changes may link to migration and conflicts.

The conceptual framework underlying the study, illustrated in Figure 1 below, builds on that of the 2009 report of the UN Secretary-General on *Climate change and its possible security implications* (UN General Assembly 2009). Vulnerability-inducing climate variables used includes changes and variability in temperature and rainfall, frequency of droughts and floods and sea-level rise. Changes in these variables can lead to: (i) greater food and water insecurity and health issues; and (ii) changes in natural resource availability. In turn, these could result in competition for resources, localised conflicts, migration and ultimately, political destabilisation. Non-climatic political, economic and social factors; increasing demographic pressure and environmental degradation also play a significant role in influencing any result. Therefore this Chapter argues that climate change adaptation policies that are sensitive to migration issues and conflict risk, and that promote sound governance of natural resources and sustainable development, have the potential to minimise the threats posed by climate change.

Figure 1: Conceptual framework



On this basis, the Chapter examines the relationship between climate change, migration and conflict. It also highlights areas of particular interest for policymakers, donors and field practitioners, or areas where further research is needed. In no way does it argue that climate change acts as a single and isolated factor in migration or conflict, nor does it attempt to show a direct causal link between these three issues. Climate change, migration and conflict, rather, are interlinked through complex influencing factors that include the economic, the social and the political.

Historical changes in climate indicators and impacts on livelihoods

To assess the impacts of climate changes on livelihoods, responses and outcomes (namely migration and conflict), an analysis of historical changes in climate in the region was conducted on four climate indicators and time periods based on the best available data: temperature (1970–2006), precipitation (1970–2006), drought (1982–2009) and floods (1985–2009). Additionally, sea level rise projections were extrapolated to coastal regions to assess the impact on vulnerable populations. The following section is a summary of the results from this exercise.

Changes in temperature

Absolute changes in mean seasonal temperature in degrees Celsius ($^{\circ}\text{C}$) from 1970 to 2006 were assessed using aggregated data from regional weather stations with readings taken annually from May to October. This period includes the rainy and cropping season months of July to September as well as ‘buffer’ months to capture natural variance. This period has been chosen as it is the most critical time period for agriculture-based livelihoods.

Map 1: Temperature – average seasonal temperature in the CILSS countries (1970–2006)

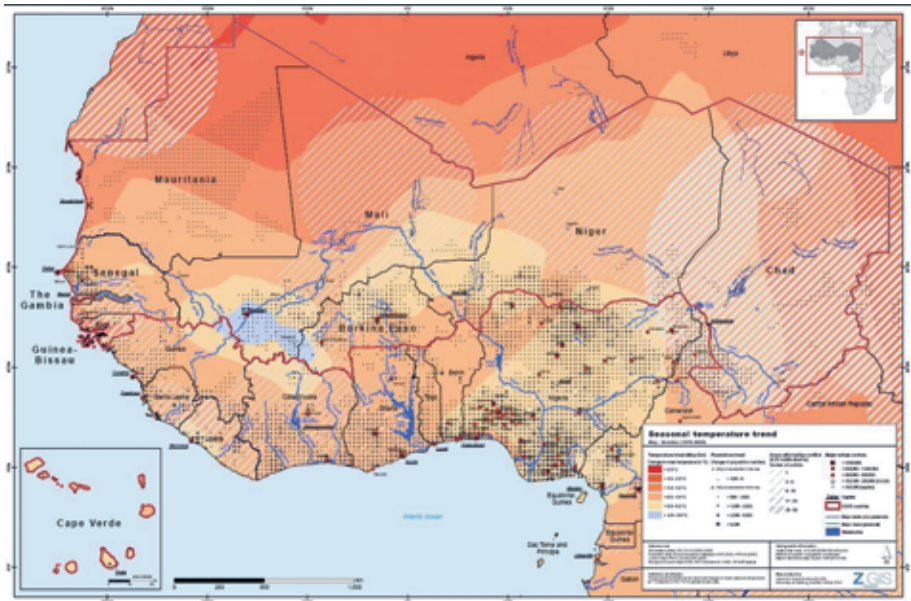
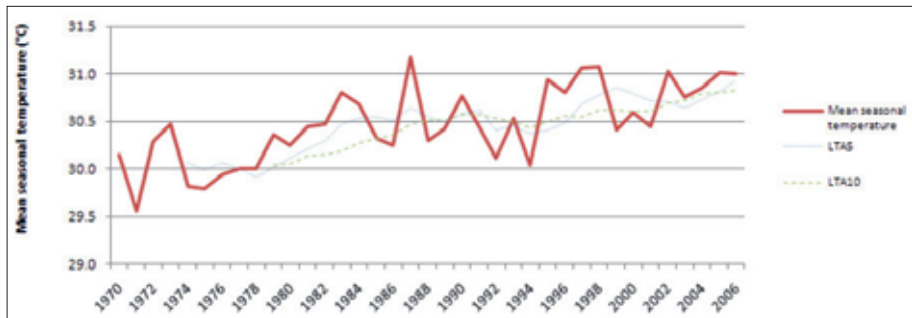


Figure 2: Mean seasonal temperature in the CILSS countries (1970 – 2006)

(Source: Climate Research Unit Time-Series (CRU TS) 3.0 climate data. Includes the five-year long-term average (LTA5), and the ten year long-term average (LTA10)).

According to the data, there has been an overall rise in mean seasonal temperature in CILSS countries from 1970 to 2006 of approximately 1°C (Figure 2). The only area to experience a decrease in seasonal temperature is in southern Mali near Bamako, and small adjoining parts of Burkina Faso and Guinea. There have been very significant increases (between 1.5°C and 2°C) in the north of the region, including in far eastern Chad and the northern regions of Mali and Mauritania. Increases in temperature of 1°C to 1.5°C are observed across Mauritania, Mali, Chad and the very northern regions of Niger, along the border with Algeria and Libya, while increases between 0.5°C and 1.0°C are found along the Atlantic coast from Senegal to Togo, in certain parts of Cape Verde, in most of Niger, in southern and central Burkina Faso and in western Chad. Finally, less marked increases of up to 0.5°C have occurred in much of southern Mali, northern and western parts of Burkina Faso, northern Guinea and Côte d'Ivoire, coastal Liberia, pockets of Senegal, south-western Niger and most of Nigeria. The data also shows that from 1976 to 2006, nearly half of the total area and almost half of the total population of the CILSS countries experienced a 0.5°C to 1°C increase in temperatures. Some 15% of the population experienced a more significant increase of 1.0°C to 1.5°C, representing approximately 30% of the total geographical area of the CILSS countries.

While secondary sources (see below) do not currently single out temperature increases as a factor directly affecting livelihoods in the region, it is expected to have a very significant impact in years to come, including on food production. Further increases in temperature will affect mostly pastoral and agro-pastoral areas, according to ECOWAS and the OECD (2006). A recent study by CILSS shows that an increase of more than 2°C will result in a decrease of 15–25% in the yields of millet and sorghum, a staple for the diet of the Sahelian population, in Burkina Faso and Niger by 2080. Similarly, it is estimated that with an increase of 2°C, maize yields will decline by 5% (CILSS 2010). On the other hand, rice yields are estimated to increase in the

short-term by 10–35%, given sufficient water availability, as rice plants benefit from higher concentrations of CO₂ in the atmosphere (CILSS 2010). In the long-term, however, this increase is expected to decrease to below normal levels as a result of increased temperatures (CILSS and AGRHYMET 2010).

These findings are mirrored by other studies. In 2008, the FAO conducted a global simulation on cereal production. Comparing baseline average data from 1961 to 1990, the FAO (2008) predicts significant declines in cereal production by 2050; with a 20–50% decrease in cereal productivity in the Sahelian belt from Niger to Senegal. Increased temperatures are also expected to change the spread and occurrence of various diseases and pests, such as locusts, with potential serious effects on plant, animal and human health (Trantalos et al. 2010). There are also several uncertain factors influencing how increases in temperatures will affect livelihood practices in the region, such as potential changes in evapotranspiration rates and water availability.

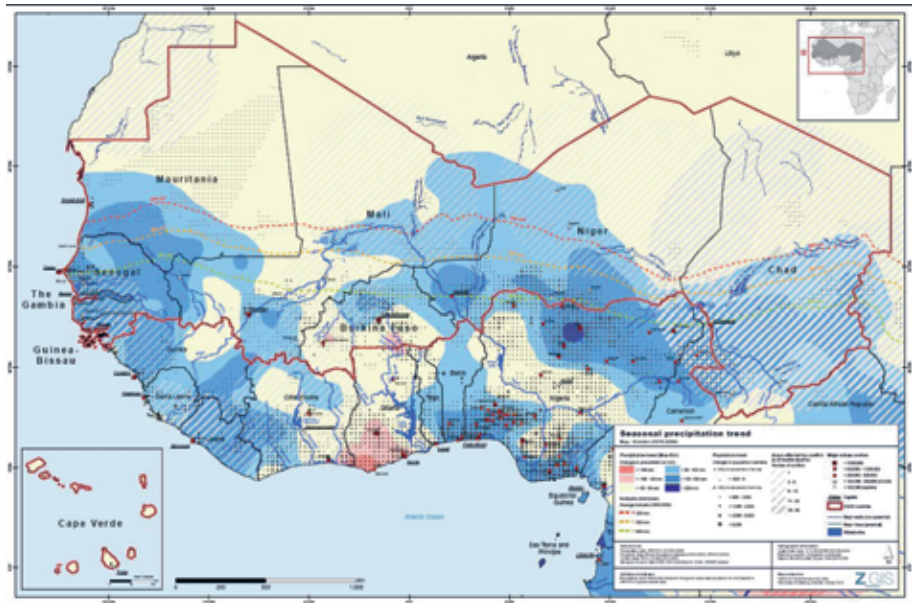
Changes in rainfall

Seasonal rainfall in millimetres (mm) during the 1970 to 2006 time period was measured based on data¹ recorded annually between May and October. As noted, these months were chosen due to the importance of rainfall during the cropping season.

According to the data, overall seasonal rainfall in the region has increased during the 36-year period. Three areas experienced declines in seasonal rainfall of more than 50 mm: Bobo Diolasso in Burkina Faso, the Burkina Faso and Ghana border, and the southern coast of Ghana stretching into Côte d'Ivoire. Constant levels of rainfall are observed in northern parts of Chad, Mali, Mauritania, and Niger, most of Ghana, central Nigeria, Côte d'Ivoire, Cape Verde, a large area spanning northern Guinea and south-western Mali, and southern Burkina Faso (Map 2).

1 The data used is in absolute changes in rainfall rather than the actual rainfall amount in the region.

Map 2: Trends in seasonal rainfall (1970–2006)



Much of the remainder of the area has experienced increases in rainfall. Average increases of 100 to 250 mm were recorded in 17% of the region, where approximately 40% of the population is living. Seasonal rainfall increases of 50 to 100 mm occurred in northern and western Côte d’Ivoire; parts of Guinea and Guinea-Bissau, Togo, Benin, southern Mauritania; parts of Senegal, Sierra Leone and southern Nigeria; and in the central Sahel region that encompasses parts of northern Burkina Faso, Mali and Niger.

It is acknowledged that the findings of this mapping process leave a number of questions regarding the duration, variability and intensity of rainfall in any one season unanswered, as the available data and sparse network of weather stations do not allow for such an analysis. These factors can have significant impacts on livelihoods, for example, when a large proportion of the seasonal rainfall is received in a small number of intensive events rather than evenly over the cropping season, causing erosion of topsoil and destruction of crops.

The main issue of concern from a livelihood perspective in respect to changes in rainfall variability is related to food security (CILSS & AGRHYMET 2010). Although increases in rainfall can create more favourable conditions for agricultural practices, variability in rainfall or more intense rainfall affect farmers through the loss of soil because of intensive rain events and poor crop yields from changes in timing in rainfall. Changes in rainfall also affect the prevalence of crop pests, as improved ecolo-

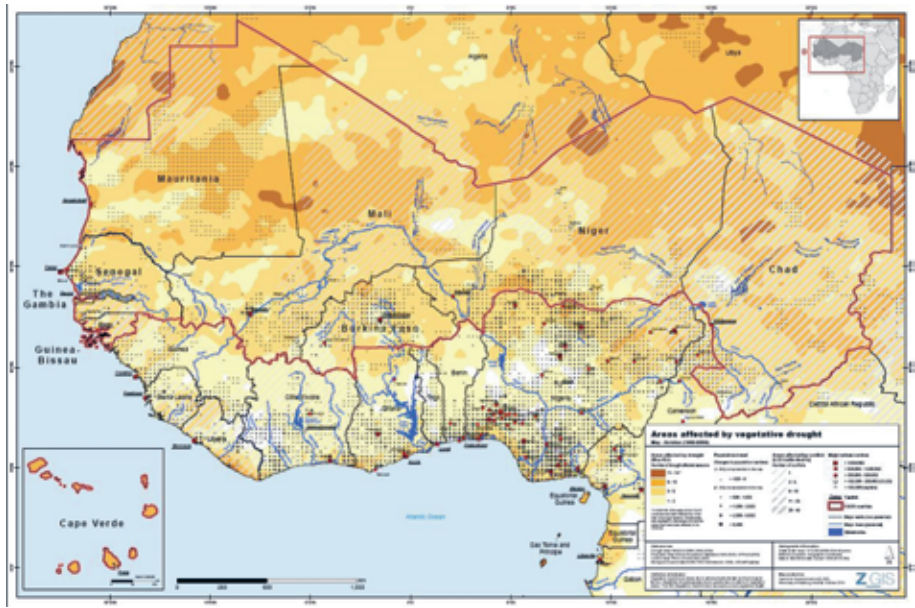
gical conditions such as soil moisture and vegetation cover can promote their growth, which in turn further increases the threats to crops (Trantalos et al. 2010). Pastoralists are mainly affected by changes in rainfall that occur in the arid and semi-arid areas of the Sahel and influence the availability of shrubs, grasses and water sources for livestock. Furthermore, where rainfall is reduced, water for cattle and fodder production is disturbed, leading to changes in migratory patterns for pastoralists. When traditional patterns are disturbed, CILSS and AGRHYMET's studies (2010) have shown a weakening of the social fabric and a loss of confidence, as well as increased mistrust within and between communities.

One telling example is the 2005–2006 food crises in Niger. Causes of the crisis included an early end to the rains, desert locust damage to pasture lands, high food prices and a population living in chronic poverty. The drought and locust damage resulted in the largest fodder deficit in Niger's history, forcing herders to move south to the coast and dry season grazing grounds in Nigeria earlier than usual. Such early movements resulted in increased competition for resources and the destruction of crops before they were harvested in the receiving areas, and lead to conflicts with local farming communities further south (Azuwike & Enwerem n.d.). Although pastoralists have traditionally migrated southwards along established livestock pathways, agriculturalists have also often spread their cultivation onto these pathways, preventing the safe passage of herds, as a deliberate act of 'claiming' the space and diverting pastoralists (Turner 2004). In addition, high cereal prices and low livestock prices in pastoral and agro-pastoral areas forced some households to liquidate assets, increasing their vulnerability for future years (OCHA 2006).

Changes in the occurrence of droughts

The region has experienced three major drought periods during the last century: 1910–1916, 1941–1945 and a longer period starting in the 1970s, which can be considered to be still ongoing despite some interruptions due to one-off seasons with adequate rainfall. Despite some increase in the amount of precipitation, as described in the previous Chapter, recurring droughts are still a main cause of human suffering and food insecurity in the region. The study shows that most countries in the region have experienced vegetative drought – when the vegetation experiences stress due to adverse hydro-climatic and hydrological factors, with a higher number of droughts in the northern parts of the region (Map 3). The severe effects of droughts in the region are sadly evident with the ongoing food crises in the Sahel, to a large part caused by droughts affecting crops and pastures in the 2011–2012 farming season (Gubbels 2011; OCHA 2012). In Niger, for example, OCHA notes that small farmers faced with their third drought in seven years are forced to consider bundling up their few possessions and leaving the villages they have lived in all their lives for good (IRIN & OCHA 2012).

Map 3: Areas affected by droughts (1982–2009)



Large areas of Chad, Mali, Mauritania and Niger faced between 6 and 10 drought seasons between 1982 and 2009, with smaller pockets experiencing between 11 and 15. Smaller areas of Burkina Faso, Liberia, Senegal, Ghana and Nigeria – as well as all the islands of Cape Verde – have also been affected by a high number of drought seasons. The incidence of drought across central and southern Sahel has generally been lower, with eight additional countries (Senegal, the Gambia, Guinea-Bissau, Guinea, Sierra Leone, Côte d’Ivoire, Ghana and Benin) experiencing between three and five drought seasons, and Togo between one and two.

When cross-referenced with population and area data, less than 1% of the CILSS population experienced 11–15 drought seasons during the study period. However, nearly 8% of the population faced 6–10 drought seasons, covering almost 35% of the area of CILSS countries. Since 1971, over 62 million people in the broader region (CILSS and ECOWAS countries) have been affected by drought, requiring emergency assistance (Centre for Research on the Epidemiology of Disaster 2011).

Droughts, similar to floods, have been recognised to trigger events of food insecurity, by undermining crop yields and leading to reductions in food availability within individual households (Devereux 2007). This decline also impacts the income of farmers – and that of countries which depend on the sale of agricultural goods (Devereux 2007). For example, during Niger’s food crisis of 2005 the impact of the drought com-

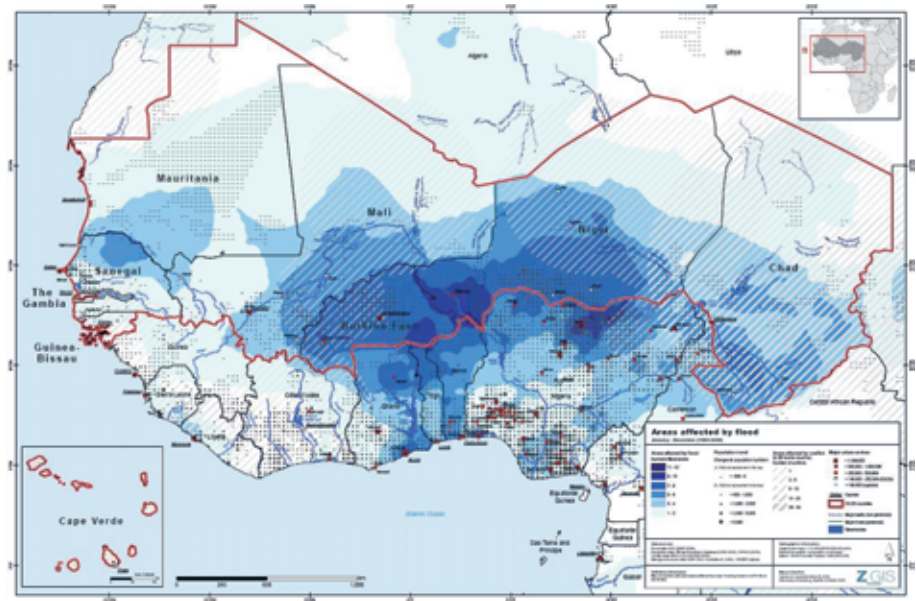
bined with a locust invasion, lead to absolute declines in food availability, coupled with poor households' inability to purchase the food that is available (WFP 2005).

Droughts, in combination with changing rainfall patterns, have also contributed to changes in livelihoods. For instance, agro-pastoralism has become increasingly popular, as this livelihood system combines farming and livestock-raising and is believed to be a strategy used to mitigate increasing climate uncertainties (ECOWAS & OECD 2006). The move to agro-pastoralism has reduced interdependencies between farmers and herders and increased competition for suitable lands. For instance, conflicts have been observed in Nigeria, where Fulani herders from the north are remaining in the south for longer periods, or even becoming sedentary. After the droughts in 1998 in West Africa, this has led to increased pressures on farmlands and local resources, resulting in violent conflicts with local farming hosts in the south (Azuwike & Enwerem 2010). The shrinking of Lake Chad, in combination with a rapid increase in population has also contributed to conflicts through an intensification of contacts between major livelihood groups (farmers, pastoralists and fishermen), having changed their relationships from having complemented each other, to one with increased competition over the same resources (Abdouraman 2008; Mwiturubani & Van Wyk 2010).

Changes in the occurrence and frequency of floods

Historical data from the Dartmouth Flood Observatory was used to calculate when floods occurred and to determine whether the frequency of floods has increased from 1985 to 2009. The study shows that the central parts of the study area was most affected by flooding during the study period, with significant areas of southern Burkina Faso, northern Nigeria and south-western Niger experiencing between 9 and 10 floods, and the border between Benin and Niger, as well as small pockets of Nigeria facing up to 12 (Map 4). Virtually the entirety of Burkina Faso; most of Southern Niger, northern Ghana, Benin and Togo; as well as northern Nigeria and southern Chad experienced between 7 and 8 floods, representing 36% of the population and more than 11% of the land area of the CILSS countries. Over the same period, large parts of Mali, Ghana, Senegal, Benin, Niger, Nigeria and Chad – including an estimated 18% of the population and 15% of the land area of the CILSS countries – experienced 5 to 6 floods. The remainder of the region experienced lower incidences of flooding, with zero to two floods in most of the countries along the Atlantic coast, from Gambia to Côte d'Ivoire.

Map 4: Areas affected by floods (1985–2009)



When analysing the frequency of floods and the land area affected, it can be observed that for the areas that have experienced 9–10 flood events over the time period, both the frequency and area covered by floods have increased. When flooding did occur in the first half of the time period covered (1985–1995), approximately 50% of the area was experiencing flooding during any one year. However, in the past 15 years, when flooding has occurred, all of these areas have been affected, illustrating a wider and more severe inundation (Figures 3 and 4).

Figure 3: Frequency of and land area covered by flooding in countries experiencing 9–10 floods

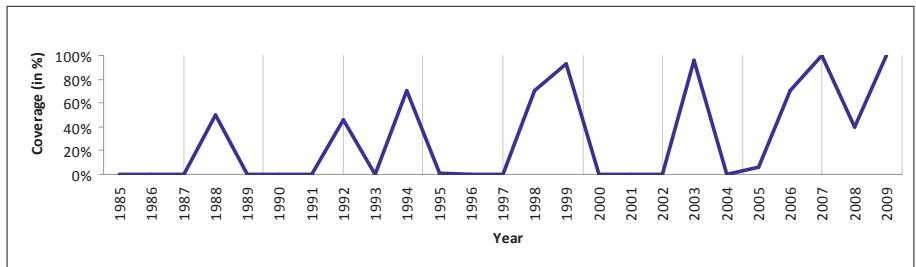
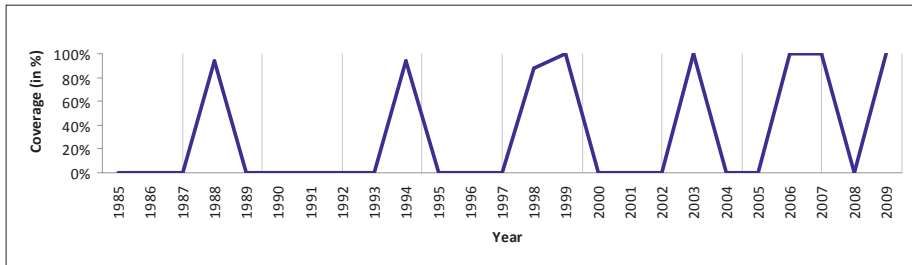


Figure 4: Frequency of and land area covered by flooding in countries experiencing 11–12 floods

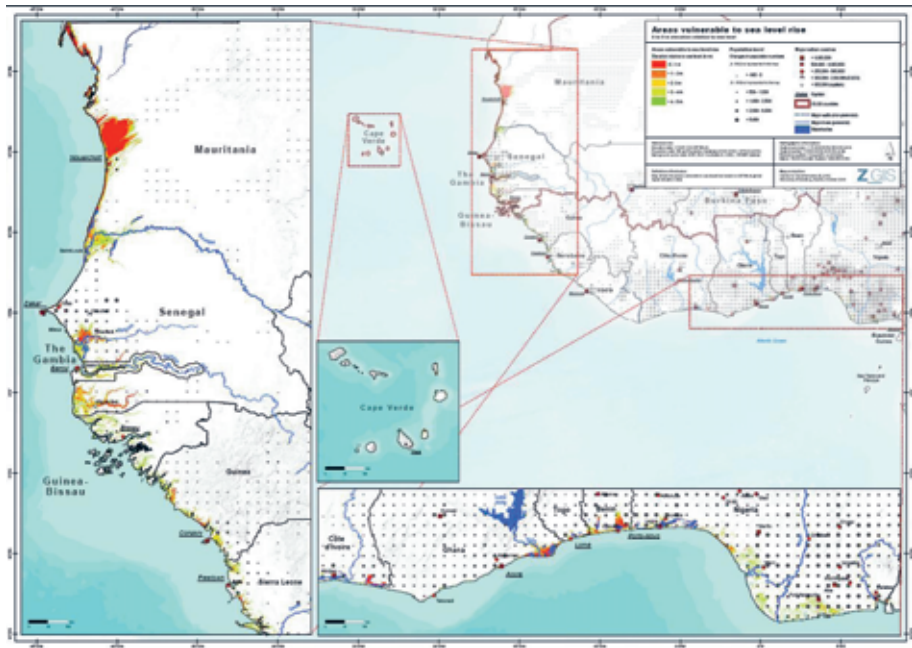


The damages created by floods (such as those that devastated Ouagadougou, Burkina Faso in 2009 and southern Benin in 2010) illustrate the lack of preparedness and infrastructure to address intense rainfall. Additionally, floods in 2010 led to major crop losses. Nigeria had an approximate loss of 180 000 hectares (ha) of crops, due to inundation; Benin with a total loss of approximately 140 000 ha of crops; and Chad with approximately 110 000 ha lost (CILSS 2010). In combination with volatile global commodity markets and availability of food aid, such drops in production risk compounding the price of staples, such as rice, corn and wheat (CILSS 2010). Such rises in food prices affect the poorest and most vulnerable the most, and can lead to suffering and social unrest (Bare 2011).

Regions vulnerable to sea level rise

The IPCC (2007) predicts an 18–59 cm sea level rise globally by the year 2100. However, more recent reports point to likely increases of close to a metre or more by the end of the century as a result of, for example, faster melting of the Greenland ice sheets (AMAP 2011). In the study region, this rise is expected to have a major effect on some coastal areas. Coastal areas vulnerable to sea level rise were identified based on the NASA Shuttle Radar Topographic Mission (SRTM) data, and using future projections, rather than historical data (Map 5). The most vulnerable zone includes areas that are less than one metre above sea level. All coastal regions up to 5 m elevation relative to sea level have been identified as potentially at risk because of increased coastal erosion, saltwater intrusion, and seawater inundation. Cross-referenced population data indicate that a 0–1 m rise in sea level would directly affect over 3 million people living in the coastal areas of the study area.

Map 5: Areas vulnerable to sea level rise



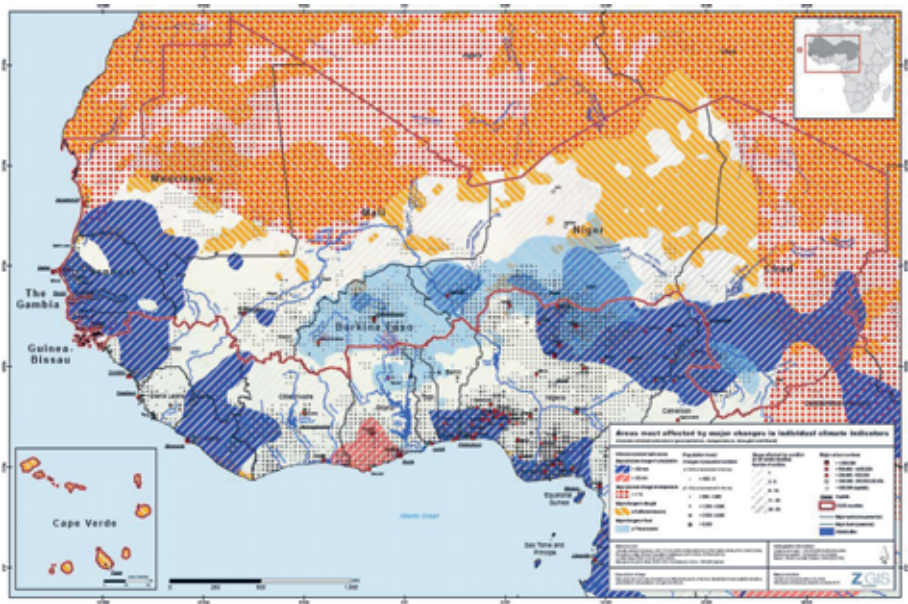
The most vulnerable areas are near Nouakchott in Mauritania (709 000 inhabitants), which is located 2–3 m below sea level, and parts of the coastline east of Accra in Ghana to Porto-Novo in Nigeria, including Benin. Much of the western coastal zone of the Sahel, including parts of Senegal, the Gambia, Guinea-Bissau, Guinea, as well as further south all the way to Sierra Leone is also vulnerable due to its low elevation (0–1 m above sea level). Furthermore, 6 of the largest cities of the region – Lagos (10.5 million inhabitants), Abidjan (4.1 million), Dakar (2.8 million), Accra (2.3 million), Conakry (1.6 million) and Lomé (1.6 million) – could be affected as they are located at the coast. This applies to smaller cities such as Cotonou, Banjul, Bissau and Porto Novo, and dense urban areas close to the Senegal River, the Saloum Delta, and the Volta Delta (UN Population Division 2011). Sea level rise could also have an impact on agricultural production that occurs at or near the coast, and cause saltwater intrusion into freshwater lagoons and lake systems.

Responses to climate changes in the region

The trends observed over the last 40 years show that in the study region, overall rainfall variability has increased, temperatures have risen, droughts have been recurrent and severe, and floods have occurred more frequently. A summary of areas that have been most severely affected can be seen on Map 6. These changes, in turn, have al-

ready affected livelihoods in the region by increasing vulnerability and affecting the availability of natural resources. This section examines the linkages between the livelihood impacts caused by changing climatic conditions and behavioural responses, namely, conflict and migration. Based on a wide range of existing literature, as well as case studies and field observation, the section discusses three main behavioural trends or responses: (i) southward migration to cities and coastal regions, (ii) environmentally-induced migration caused by rapid-onset disasters, and (iii) conflict over fertile land and water resources.

Map 6: Areas most affected by changes in individual climate indicators



As noted previously, it is difficult to isolate climate-related factors contributing to migration and conflict from economic, social, cultural, demographic and political factors involved. However, it is important to highlight and understand the exacerbating effect of changes in climate on population dynamics and conflict in the region, in order to ensure that these risks are considered and addressed as part of adaptation policies and strategies.

Permanent migration southwards to cities and the coast

Increasing rural to urban migration can be seen around the world, with the number of people living in urban areas surpassing those in rural areas in 2009 (UN Population Division 2009). Among countries in the study region, the UN Population Division (2009)

projects a 25% increase in the urban population between 2009 and 2050. In the Sahel, the traditional temporary and seasonal migration patterns of many farmers, pastoralists and fishers in the region are increasingly being replaced by a more permanent shift southward and to cities (Trench et al. 2007; Azuwike & Enwerem 2010). Examples of where conflicts have occurred between farmers and pastoralists exist in both Niger and Nigeria when pastoralists migrate earlier to the south than usual, or become sedentary in these receiving areas (Azuwike & Enwerem 2010).

Nearly half of the West African population now live in largely overcrowded coastal cities, including 12 townships of over one million inhabitants along the coastline from Senegal to Nigeria (ECOWAS & OECD 2006; Dietz & Veldhuizen 2004). As mentioned by the IPCC, it is predicted that the 500 km coastline between Accra and the Niger delta will be an urban megalopolis of 50 million people by 2020 (Hewawasam 2002).

Many farmers, herders and fishers have permanently moved to cities and urban areas due to both push and pull factors. In northern Niger, for example, Tuareg and Wodaabe Fulani pastoralists often cannot find enough available pasture, water or land to sustain traditional livelihoods. Though some have tried adaptation mechanisms, such as planting fields in the marginal land of the pastoral zone or buying supplemental fodder to sustain their animals, many have lost their herds and migrated to urban areas in search of alternative livelihood options (Woodke 2008).

The environment, in combination with economic, social, and political factors, can act as a negative push factor. Many agricultural areas have low productivity or degraded natural resources (Batterbury & Warren 2001) and changes in climate further challenge productivity (Hall et al. 2003; Tonah 2002; Nori et al. 2005). Changes in rainfall patterns and recurring droughts have been cited as major push factors for migration (Henry et al. 2004). For example, during the drought period from the 1960s to 1990s an estimated one million people left Burkina Faso, mostly resettling in urban areas throughout West Africa (Brown & Crawford 2008).

Drought and rainfall changes have also contributed to a decline in water bodies and a more permanent migration of fishers to a dwindling number of lakes, rivers and coastal regions where fish can still be caught (Thomas 1995; IOM 2009). Reduced rainfall and elevated temperatures, in combination with irrigation schemes, have contributed to evaporative losses and reduced runoff into water bodies. Flows in the region's main watercourses – the Gambia, Niger, and Senegal rivers – have declined by 25% to 60% over the last 30 years (ECOWAS & OECD 2008). Drought has also diminished vegetation cover and contributed to greater sand deposits in the Niger River basin, the Senegal River, Lake Chad, the Logone/Chari River system, and their respective tributaries (Afifi 2009). These changes can most dramatically be seen in the drying of Mali's Lake Faguibine in the 1970s, which in conjunction with more structural issues such as poverty, has spurred migration in the region (IOM 2009).

While the environment and natural resources can act as push factors, cities and urban areas can provide strong pull factors, with economic opportunities playing a major role in labour migration. Specifically, cocoa farms in Côte d'Ivoire, coffee plantations in Ghana, and the oil industry in Nigeria have all drawn in migrants from across West Africa (Black et al. 2004). Recent figures show that about 3%, or 7.5 million, of the population in West Africa are migrants, compared to 2% in all of Africa (European Centre for Development Policy Management 2010). Further, as centres of information exchange and technological advancement, people routinely migrate to cities for better job opportunities, education, health care, shelter, access to information, and cultural diversity. However, cities are frequently ill-equipped to absorb new populations and often struggle with infrastructure, providing adequate housing, and larger challenges associated with integration and inequality (UN HABITAT 2008).

Climate-related migration from rapid-onset disasters

The main rapid-onset disaster affecting the area is floods. Floods are exacerbated in the region by the poor absorption of water by the soil. Water runoff can be 15–40% of total rainfall because of hard, crusted terrain and limited vegetation, increasing the inundation of water catchments, river plains and low-lying areas (Fox & Rockström 2003), degrading land and washing away topsoil.

Migration resulting from rapid-onset disasters was seen in the 2009 floods that affected more than 700 000 people in the region and killed over 150, according to OCHA (2009). For example, Ouagadougou, the capital of Burkina Faso, received 35% of its annual 750 mm rainfall average in just 12 hours. This resulted in 150 000 people losing their homes and in nine deaths (OCHA 2009).

With 42% of the CILSS population affected by 7 or more floods, these abrupt climate events can act as triggers, contributing to migration by destroying homes and critical infrastructure. A greater number and coverage of floods in the region also allows for less recovery time between floods for farmlands, pastures, livestock and fisheries. This increased frequency can contribute to incidents of forced migration. Over time, recurrent flooding can lead to more permanent migration of people away from flood prone areas.

One example can be found in Ghana. The country experienced unprecedented flooding in August 2007 that devastated the nation's crops and infrastructure and led to the displacement of over 330 000 people (Inter-Ministerial Disaster Relief Committee and UN Country Team Ghana 2007). Estimated losses of cereals and food items amounted to nearly 260 000 metric tonnes and with a number of irrigation dams and wells destroyed, many farmers were forced to migrate to other farming regions or seek new economic opportunities (Rain et al. 2011). Leaving their crops untended, those who returned several months later found their lands barren and in need of new cultivation (Rain et al. 2011). These devastating floods and resulting economic losses fur-

ther aggravated food insecurity in a region already plagued with chronic malnutrition and famine.

Climate-related conflict over scarce resources

Changes and variability in climate can directly and indirectly contribute to unrest by exacerbating tensions over natural resource availability, notably fertile land and water. A study by Brown and Crawford (2009) has found that drought recurrence, in combination with social and economic factors, has contributed to conflicts between rural populations in the region. A key response to changes in natural resources availability by many farmers, herders and fishers has been a diversification into other agricultural practices. For example, without enough fish to catch, some fishermen have sought land to raise cattle and grow crops; farmers have become farmer-livestock keepers or fisher-farmers; and some herders have moved to southern pastoral lands to take up sedentary farming (Thomas 1995). These changes in livelihoods have placed groups in direct competition with each other over land and water.

This situation is sadly exemplified with the situation around Lake Chad, where disputes focused on access to and use of water, on land and on fish catches have been occurring regularly². As the receding waters expose new islands, land ownership issues are also causing problems between Cameroon, Chad, Niger and Nigeria. Furthermore, the incapacity of existing political institutions to resolve these competing claims increases the likelihood of violent conflicts over resources (Mwiturubani & Van Wyk 2010). Another example is the farming Soninke and the herding Toucouleur communities in Mali, as highlighted by Moore (2005). These communities have long cooperated in trading manure and grain. When the Toucouleur established a village in the region, the Soninke also started raising livestock. Reduced rainfall increased competition for feedstock and the crowding of farming lands with greater herd numbers. There has since been a growing low-level conflict between the two groups (Moore 2005).

Competition for freshwater and coastal resources among traditional fishers and newly arrived migrants is also increasing – leading to heightened tension and small-scale conflict. Within the region this is most evident at Lake Chad. While 30 million people live in the lake region, the lake has shrunk from 25 000 km² to 1 350 km² since 1963. There have been heightened tensions over water access between different communities and livelihood groups resulting in both migration and increasing territorial dis-

2 Murray S, Lake Chad fishermen pack up their nets, *BBC News*, 15 January 2007. Accessed May 2011, <http://news.bbc.co.uk/2/hi/africa/6261447.stm>

putes. Such disputes have focused on water between upstream and downstream communities, land between farmers and pastoralists and fish catches³.

Changes in climate and their effects on natural resources can also lead to greater food insecurity. The rising cost of food in the region has been a source of tensions and protest in the past, as noted by a study from the Climate Change and African Political Stability project (CCAPS 2011). When changes in climate in combination with global commodity prices, threatens local production and availability of staples, this further increases the risk of tensions and conflict. The landlocked countries in the region which produce the majority of the region's cereals (more than 87% of the CILSS countries overall production) have all experienced changes in temperature and rainfall, and occurrences of drought and floods (UNEP et al. 2011). Consequently, there have been instances of food shortages in nearly all these countries. Niger was assessed in 2005 as having 2.4 million people highly vulnerable to food insecurity, including nearly 900 000 facing extreme food insecurity and 1.2 million needing food aid (UNEP & World Agroforestry Centre 2006). Food shortages, in combination with increasing global prices of food commodities have led to unrest and even conflict, as seen with the 2008 food riots in Burkina Faso, Côte d'Ivoire, Mauritania and Senegal (Patel & McMichael 2009).

Improving adaptation planning in the Sahel

Policies that spell out strategies for climate change adaptation and regulating the use and management of natural resources can have both positive and negative impacts on the livelihoods that depend on those resources. While little is known to date about the long-term effects of adaptation policies in the region, some studies suggest that policies and interventions that focus on reducing specific climate sensitivities can benefit some interests while negatively affecting other groups or creating social inequity (Eriksen & Brown 2011). In some cases, such as in the construction of dams for irrigation or hydroelectricity, this could lead to tensions between competing groups or to the involuntary displacement of the disadvantaged. In other words, neglecting the factors that can trigger conflict and migration can result in adaptation policies that compound the risks posed by the climatic conditions they aim to mitigate. This includes resource rights, land tenure and access to justice, all of which are prerequisites for effective national and local-level governance, and where conflicts between national and local/traditional governance structures exist.

Sustainable development strategies have long sought to be sensitive to migration and conflict risks, recognising that these phenomena can have a major impact on the

3 Murray S, Lake Chad fishermen pack up their nets, *BBC News*, 15 January 2007. Accessed May 2011, <http://news.bbc.co.uk/2/hi/africa/6261447.stm>

achievement of development goals (IOM n.d). Climate adaptation strategies also need to incorporate these considerations in order to ensure that related policies and projects maximise conflict prevention opportunities and positively influence migration dynamics (Waqo & Rachael 2008; Saferworld 2010). A number of adaptation planning documents in the region already recognise the linkages between changing climatic conditions and behavioural responses such as migration and conflict, but few have so far included provisions addressing these risks (UNEP et al. 2011).

Issues of climate change and migration are also regional in nature, and as such should not only be managed at the national level, as is most commonly the case today. Likewise, many cases of conflict in the region are transboundary, as competition for scarce natural resources pushes various groups beyond national borders in search of improved livelihood conditions.

Conclusion and recommendations

This Chapter presents historical climate trends across the 17 countries included in the study region and examines how these changes have exacerbated existing vulnerabilities. In particular, the study has sought to examine the link between the impacts of changing climatic conditions on livelihoods in the region and behavioural responses such as conflict and migration. The Chapter demonstrates that a change in climate indicators for the past 40 years can be seen in the Sahel region – including rising mean temperatures, recurrent droughts, changes in rainfall and more frequent and severe floods – and that these changes exacerbate already existing vulnerabilities for livelihoods. The impacts of these changes on the population depend on both exposure and their level of resilience, with food security being a major factor to take into consideration.

It is to be noted that migration and the movement of people and livestock is a traditional way of adaptation that is an integral part of livelihood strategies in the region, offering opportunities for trade and the exchange of ideas as well as livelihood options. Migration, however, also occurs as a result of traditional and non-traditional livelihoods no longer being viable due to changes in the natural environment (from climate change or overall environmental degradation). Changes in the climate, coupled with other challenges, such as population growth, weak governance and mediation mechanisms, as highlighted in Figure 1, have also led to increased competition over scarce natural resources and have created tensions and conflicts between communities and livelihood groups. Finally, adaptation policies do not systematically take migration and conflict into account and are primarily national in scope, while the issues they address are regional in nature.

Based on the changes in climate observed across the study region and an examination of how these changes have exacerbated existing vulnerabilities, a series of recommendations is presented below. Primarily, experiences in the Sahel illuminate the

critical need for sensitising national and regional adaptation strategies to conflict and migration. Adaptation policies and programmes that aim to reduce livelihood vulnerabilities, promote alternatives and improve the availability and access to natural resources can mitigate the drivers of migration and conflict and help secure development gains. Engaging local communities before designing and implementing climate change adaptation strategies, in order to fully understand and integrate local and regional conflict dynamics is one important step. In addition, the positive role of migration should also be considered, particularly for communities facing less advanced stages of environmental degradation. Finally, the benefits of climate change adaptation policies should be carefully considered across social groups so that they do not reinforce inequalities, for example, with regard to ethnicity or gender.

Secondly, the transboundary nature of climate change, migration and some conflicts should increasingly be addressed through regional cooperation, including through regional institutions like CILSS and ECOWAS, as well as the African Union. Climate change adaptation programmes in the Sahel should focus on the most vulnerable groups, such as pastoralist societies, and build upon existing policies, such as the African Union's policy framework for pastoralism in Africa. UN organisations should, in turn, strengthen their cooperation with these regional structures, for example, through joint programmes and projects for conflict prevention and disaster management related to environmental factors and the increasing displacement of communities due to environmental change. Furthermore, national laws and policies on natural resources and environmental issues should be harmonised across the region in order to avoid inconsistencies or discrepancies between neighbouring countries that could lead to increased pressure on natural resources in areas with weaker legislation.

Additionally, livelihoods provide a clear stepping stone between climate change and conflict risk, and between climate change and migration. A livelihoods approach is therefore suggested for future work focusing at how resource availability is changing; how livelihoods and food security are being affected; what coping strategies or adaptation measures are being adopted; whether competition between livelihood groups over scarce resources is increasing; and what specific technical and financial support is needed to increase livelihood resilience to changing climatic conditions in the region, thereby reducing conflict risk and forced migration.

Furthermore, 'green farming' practices, including 'climate proofing' agricultural practices and integrating traditional farming methods with resource-efficient techniques, as highlighted in UNEP's report on agricultural options for a greener economy (UNEP 2010) can decrease the risk of food insecurity, and should therefore be considered in adaptation policies and projects. Such practices have been shown to increase yields, especially on small farms. It is furthermore important to prioritise investments that benefit the local environment and improve ecosystem services, as it is these services on which the poorest people rely on for their livelihoods. Small landholder production should also be increased, diversified and commercialised, thereby

creating local job and market opportunities. Employment opportunities and enhanced food security resulting from improved agricultural productivity based on sustainable practices also increase resilience to climate stressors and can therefore reduce local tensions and forced displacement.

Early action on the environmental drivers of crises can also help prevent and defuse both imminent threats and broader instability. Dispute resolution should be promoted by building local, national and international capacity to conduct mediation between conflicting parties where tensions are linked to natural resources. Traditional conflict mediation practices form a critical part of dispute resolution (Nyong 2005) and should also be adapted to the new realities on the ground as a result of changes taking place in the climate and local environment. Furthermore, clarifying resource rights and land tenure is a prerequisite for effective national and local-level governance.

Finally, conflict risk and issues related to migration should be used to prioritise investments, as well as build commitment from donors to long-term engagement in the region. Existing funding sources for climate change adaptation – such as the UNFCCC Green Fund, the Reducing Emissions from Deforestation and Forest Degradation (REDD and REDD+), and the Clean Development Mechanism (CDM) – are well placed to also address the emerging issues highlighted in this Chapter. Despite many uncertainties and complex interlinkages between climate change, migration and conflict, it is important for all stakeholders involved to take action in order to address the multiple challenges faced by the region, some of which are highlighted in this Chapter.

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Hurdles for pastoralism as adaptation to climate change in Southern Kordofan, Sudan

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** This article has also been published in French by the French Journal Cultures et Conflits in 2012¹. Permission to publish in English has been granted.

Abstract

It is widely believed that global climate change will have far-reaching effects and pose development and security challenges on an unprecedented scale, particularly for many Africans who depend on the environment for their livelihoods. As a form of seasonal migration, pastoralism in Sudan is and has been historically motivated and affected by climate change and variability. Some scholars have suggested that pastoralism continues to present opportunities for adaptation in areas of high climate variability, and may be more resilient than other livelihood systems that do not entail mobility. By drawing on the theoretical foundations of the linkages between migration, climate change and conflict, this Chapter examines conflicts between pastoralists and farmers in the state of Southern Kordofan, Sudan, from a resource scarcity perspective. First, it argues that structural resource scarcities have been created through the introduction of legislation on land and mechanised farming, which contribute to conflicts. It argues, secondly, that government policies have undermined the traditional institution of the Native Administration (NA), which has demonstrated the potential to manage resources and scarcities and mitigate conflicts arising from competition over resources. These two factors, compounded by natural and anthropogenic changes in the environment, and the socio-economic and political context, present key driving factors of pastoral-farmer conflicts in Southern Kordofan, and therefore critical hurdles in the promotion of pastoralism as a form of climate change adaptation in that state.

Keywords: migration, adaptation, pastoralism, Southern Kordofan, Sudan, resource scarcity, structural scarcity, conflict, climate change.

Introduction

African pastoralism² emerged seven thousand years ago and expanded across northern Africa as a means of coping with climate uncertainty and increasingly drier con-

- 1 Bronkhorst S (2012) Rareté de ressources et conflit entre pasteurs et agriculteurs au Sud-Kordofan, Soudan. Les obstacles à la promotion du pastoralisme comme forme d'adaptation au changement climatique. *Migrations Climatiques. Cultures et conflits* 88:111.
- 2 Pastoralism is a form of livelihood production concerned with livestock-raising. Pastoralists can be categorised according to the extent of movement, from nomadic, to transhumant and agro-pastoral. Nomads' movements are not predetermined but opportunistic whereas transhumant pastoralists seasonally move livestock between fixed points (Blench 2001). Agro-pastoralists cultivate land and make investments in housing and other infrastructure;

ditions (Brooks 2006). 'Prehistory and history are marked by (episodic and localised) human movement from one climate zone to another, as people have sought out environments that would support both survival as well as aspirations to a more stable existence' (Warner et al. 2009: 5).

African pastoralism was viewed by many during early colonialism as a 'stagnant, unproductive, and ecologically damaging livelihood' system, which resulted until about fifteen years ago in policies and funding that encouraged sedentarism, destocking of herds and other measures to force pastoralists to settle (Turner 2011: 469). In recent years, a new paradigm for pastoral development has emerged which recognises the value of pastoralism to African economies and the environment (Turner 2011). Some even argue that pastoralism should be promoted to a form of proactive climate change adaptation³. For instance, the Overseas Development Institute (ODI, a British think tank) and the Humanitarian Policy Group, argue that 'pastoralism functions best within the prevalent context of wide rainfall variability and unpredictability. With the right policies, investment and support, pastoralism presents a logical adaptation route in areas of increased climatic variability, and has an important role to play where other livelihoods are likely to fail' (ODI 2009: 1). Although the ODI recognises the limitations of climate projections and seems largely cognisant of the challenges facing pastoralists on the continent, others express concerns about the future of pastoralism in the face of current and future ecological, social and political vulnerabilities (cf. Blench 2001; Brooks 2006; Casciarri & Ahmed 2009; ODI 2009; Stige et al. 2006; Turner 2011).

As a form of seasonal migration (Adepoju 1995; OECD 2007), pastoralism in the semi-arid state of Southern Kordofan of Sudan will – based on current climate projections – be significantly affected by climate change. According to the Global Environment Facility (GEF 2007) in their assessment of Sudan for climate change adaptation funding, the average annual temperature will increase between 0.8–1.7°C by 2030, with greater rainfall variability, especially during the rainy season. Climates suitable for agriculture will shift even further south, reducing yields of sorghum, millet and fodder for livestock, leaving farmers and pastoralists unable to sustain their livelihoods (GEF 2007). Climate change is also argued to affect the availability of resources with declines of 0.5% per annum in rainfall calculated from 1941 to 2000 and a greater variability of rainfall recorded (GEF 2007). It is also estimated that a southward desert expansion ranging from 50 km to 200 km has occurred since records began in the 1930s (UNEP 2007: 9). These changes are a concern for at least two reasons.

at the same time they hold smaller herds and may send larger herds away with more nomadic pastoralists (Blench 2001). This Chapter is concerned with transhumance and agropastoralism as practiced by the ethnic groups in the state of Southern Kordofan, Sudan.

- 3 Adaption here is defined as an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2001). The terms 'climate change adaptation' and 'adaptation' will be used throughout.

First, pastoralism presents a critical form of livelihood production in Southern Kordofan and further afield. While the mapping of pastoral migration and actual numbers is largely guesswork, it is estimated that extensive pastoral production is practiced on a quarter of the world's (Blench 2001) and 66% of Africa's (Nori et al. 2008) land area and contributes to 20 – 25% of Africa's agricultural GDP (ODI 2009). Rain-fed farming and pastoralism have been and are the main forms of livelihood production for Sudan's ethnic groups and tribes. In Sudan, 80% of the population derive some livelihood from the agricultural and livestock sectors (GEF 2007), with pastoralism practiced by more than 20% of the populace (UNDP 2006).

Second, if pastoralism is to be promoted as a form of adaptation to climate change, there is a need for more research into a) how exactly climate change will affect pastoralism and b) the present climatic and non-climatic hurdles or vulnerabilities faced by pastoralists in Africa. This Chapter is concerned with b) and will examine conflicts between pastoralists and farmers, as they relate to resource scarcities in Southern Kordofan.

This Chapter will draw on conflict analyses by academics, international aid agencies, the Sudanese government and civil society organisations in their work to address conflicts between pastoralists and farmers in Southern Kordofan. It is supplemented by insights and findings from fieldwork conducted in July 2010⁴.

The Chapter is written in three parts. Part one assesses the theoretical foundations for the linkages between migration, climate change and conflict, with a focus on resource scarcity. Part two examines pastoral-farmer conflicts in Southern Kordofan by discussing the socio-economic, environmental and political context; by presenting a typology of pastoral farmer conflicts; and by presenting and analysing two factors which create, maintain and perpetuate resource scarcity and which undermine the ability of pastoralists and farmers to address scarcities and the conflicts arising from them. These factors are: first, land legislation and mechanised farming policies, and second, policies that have undermined the Native Administration (NA), an institution that demonstrated its potential to manage resources, address scarcities and address conflicts between user groups. Part three concludes by discussing implications for pastoralism in Southern Kordofan and for promotion of pastoralism as a form of climate change adaptation in Sudan.

4 A research report titled 'Climate change and conflict: lessons for conflict resolution from the southern Sahel of Sudan' of the aforementioned study was published by the African Centre for the Constructive Resolution of Disputes (ACCORD) in 2011. The study was driven by the premise that important lessons for addressing climate-related conflicts may be identified from interventions by international organisations and NGOs in environmental-related conflicts in the study area.

Climate change, migration, conflict and the role of scarcities

It is widely believed that global climate change will have far-reaching effects and pose development and human security challenges on an unprecedented scale, particularly for Africa and developing parts of the world (Barnett & Adger 2007; IPCC 2007; Nordås & Gleditsch 2007). But will it cause conflicts?

Although the climate debate is increasingly undergoing ‘securitisation’ (Brown et al 2007), there is little agreement on the exact linkages between climate change and conflict. Some consensus seems to be emerging that it is unlikely that climate and environmental factors alone will lead to conflicts but will rather feed into or exacerbate existing social, political or economic drivers of conflict (WGBU 2007; Gleditsch 2011; Gleditsch et al. 2007; Raleigh & Urdal 2007; Yanda & Bronkhorst 2011).

Regarding migration, the predicted outcomes on rainfall, temperatures and weather events may improve living conditions and livelihoods in some areas or make others uninhabitable, and while most changes will be gradual, allowing people an opportunity to adapt, others may be sudden, forcing people away from their homes. Livelihoods will be affected in various ways, through sea-level rise, changes in weather and rainfall patterns, and human health (Nordås & Gleditsch 2007: 634), forcing people to become mobile or affecting mobile livelihoods. In fact, the IPCC (2007) suggests that the most critical effects of climate change may be on migration.

As to the effects of climate change on seasonal migrations, such as on pastoralism, some recent studies (Hesse & Cotula 2006; Neely & Bunning 2008; Oxfam 2008) find that while pastoralists have demonstrated their adaptive capacity to climate change in the past, they face a number of other non-ecological challenges which will affect their ability to cope with and adapt to climate change. These challenges include poverty, political and economic marginalisation, and inappropriate development policies that constrain herd mobility, affect resource rights and access, and even place challenges on traditional conflict management institutions, which are critical for negotiating resource access and conflicts in Sudan and elsewhere.

As to how climate change, migrations and conflict may interact, some environmental security researchers conceptually frame the linkages between these variables in terms of resource scarcity or abundance (Homer-Dixon 1991; 1998; 1999; McLeman 2011). The scarcity discourse considers a suite of ‘critical resources’ on which a population depend for their livelihood and economic well-being and how that resource may become ‘scarce’ (McLeman 2011)⁵. Three types of inter-connected, pernicious, and mutually-reinforcing developments could lead to a resource becoming scarce (Homer-Dixon 1998; McLeman 2011):

- i) it can decrease in quality or become depleted or degraded, resulting in a reduction in the total ‘pie’ available to everyone.

5 For other neo-Malthusian works, see Hardin (1968) and Ehrlich and Ehrlich (1996).

- ii) its availability can decline, resulting in a decrease in every slice of the 'pie' available to individuals or groups. An example could be an increase in the population dependent on the resource.
- iii) it might become less accessible to some, resulting in people not getting an equal share of the 'pie'. Homer Dixon (1998) coined this phenomenon structural scarcity, and an example could be limitations placed on a resource by some, to exclude others.

The thesis is that especially in least developed countries, where many people depend on the environment for their livelihoods, climate change could lead to conflict in receiving areas when people migrate, as migration increases population sizes and density in receiving areas, while the resource base is static, declining or being eroded.⁶ This framework seems useful for Southern Kordofan, in light of the fact that pastoralism presents a form of mobility affecting not only receiving areas but all locations en route to a destination; the state is marked by a high dependency on natural resources, and (as will be demonstrated) resource scarcity plays a critical role in conflicts between pastoralists and farmers. As argued, however, conflict dynamics are complex, with scarcities being created and people's responses to those scarcities informed by the socio-economic, ethno-political and historical context. It is instructive to consider these as part of the analysis of conflicts in Southern Kordofan.

Pastoral-farmer conflicts in Southern Kordofan and resource scarcities

Socio-economic and environmental context

Pastoralists in Southern Kordofan typically make a living by raising livestock in areas where a scarcity of resources and severe climate factors limit other livelihood options, with seasonal migrations incorporated into the management of the livestock (Saeed 2009a). The majority of people depend on the environment for a living. Farmland is a sought-after commodity for settled communities and for agro-pastoralists for cash crop and food production. Grazing land is critical for pastoralists but also for settled farmers, some of whom own livestock. Those who are settled include smallholders and owners of large mechanised farming projects. Water is used for cattle and horticulture, while agriculture is largely rain-fed (Siddig et al. 2007).

Pastoralists follow dry-season grazing and wet-season grazing, generally in a north-south (in the dry season) and south-north (in the wet season) direction. Some livestock migration routes, which move through agricultural and forest areas, and cross state and

6 It can be argued that in the case of seasonal migrations, 'receiving areas' would also include transit areas where pastoralists would graze and water their livestock.

country boundaries, are hundreds of years old, while others were established during colonialism. Migratory routes are very much part of pastoral identity and their way of life (El Hassan & Birch 2008 cited in Bronkhorst 2011) and the impacts of changes in migratory routes are greater than just the threats to livelihoods, affecting other forms of well-being.

Political history and context

An analysis of pastoral-farmer conflicts in Southern Kordofan also cannot ignore the historical, post-conflict political and ethno-political reality, which remains a key factor in the challenges faced to this day (Large & Suleiman El-Basha 2010; Siddig et al. 2007). Southern Kordofan, immediately north of the new Sudanese border with South Sudan, encompasses the black Nuba ethnic group, concentrated around the Nuba Mountains, which makes up approximately 75% of the state's population (Suliman 1999). The Nuba generally practice farming and follow Christianity, Islam and animism. About 23% of the population is Arab Baggara, which includes the Messiriya, Hawazma and other tribes, who generally practice pastoralism and generally follow Islam (Suliman 1999). There are also a small number of Arab traders, called Jellaba (Suliman 1999). Before the second Sudanese civil war started in 1983, the Nuba and Baggara lived in relative peace in and around the Nuba Mountains for over 200 years where they developed ways to share the resources of the region (Suliman 1999).

However, during the second civil war, which lasted for over 20 years until 2005, the Nuba participated on the side of the then southern-based Sudan People's Liberation Army (SPLA). In response, the Sudanese government – utilising a pan-Arabist and Islamic ideology – armed the Baggara against the Nuba (Keen 2008; Suliman 1999). The 2005 Comprehensive Peace Agreement (CPA) heralded a potential new dawn for relationships between the Nuba farmers and the Baggara pastoralists, and for the likelihood of the secession of South Sudan. However, shortly before secession in July 2011, violence erupted in Southern Kordofan between Sudanese government forces and the newly titled Sudan People's Liberation Movement (SPLM) (UNMIS 2011; New York Times, 30 May 2011 cited in Rottenburg et al. 2011). At the time of writing this Chapter, media and aid agencies were banned from the region, but low level fighting seemed to continue between the rebels and government in the state^{7,8}.

In light of South Sudan's secession and recent developments in Southern Kordofan it is very likely that state policies and politics will undergo transformation and it is not unreasonable to presume that state politics and policies will be influenced by the pro-Arab rhetoric from the North. However, the state government will continue

7 Sudan and southern rebels clash in oil border state, Reuters (Khartoum), 14 January 2012.

8 For a recent critical examination of the resurgence of armed conflict in Southern Kordofan, which includes a timeline of events in narrative, see Rottenburg et al. (2011).

to contend with the challenges of climate change, and it will arguably need to address the competition over resources between pastoralists and farmers – not only in Southern Kordofan but in other states too. For these reasons, this Chapter remains relevant, despite developments.

Typology of pastoral-farmer conflicts

Traditionally, resource scarcity and the intense competition between and within pastoral, agro-pastoral and farmer groups over land and water were mitigated by seasonal migration, traditional conflict resolution and environmental management mechanisms (Saeed et al. 2009a; UNDP 2006). Recently, the competition in Southern Kordofan has intensified as a result of natural and human-induced changes in the natural environment (UNEP 2007; UNDP 2006; Saeed et al. 2009a; 2009b) and aforementioned political developments.

Notwithstanding political factors, a typology of resource-related conflicts is emerging⁹ which is confirmed by other studies – mostly conducted by aid agencies and NGOs in the region (Siddig et al. 2007). Most conflicts occur along livestock migration routes or near farmer villages, where livestock enter farmland or where farmers are cultivating land traditionally earmarked for pastoral grazing. Conflicts often result from shifting migratory routes as traditional and historical migratory routes have been destroyed and changed by inter alia the introduction of large mechanised farming projects and by the civil war. Migration routes or the timing of migration may also change, depending on weather and rainfall, contributing to conflicts.

Conflicts are also recorded between pastoral groups and owners of large mechanised farms, given that livestock routes and essential water resources for moving livestock have been incorporated into commercial farms. Conflicts over water for animal and human consumption are widespread, and take place along human-made water holes (*hafirs*), traditionally meant for livestock but some have been fenced in by farmers for other activities or are not able to sustain the populations dependent on them, especially during droughts (Bradbury et al. 2006; Siddig et al. 2007). The types of conflicts recorded vary from competition to disputes, to cases where groups access formal mediation, to cases of collective violence. Some South Kordofanians even come into conflict with others in neighbouring states. Sustained collective violence is mostly recorded in Southern Kordofan as a result of tensions between the Nuba and Baggara. Examples of disputes and violent conflicts¹⁰ include:

9 See Bronkhorst (2011), Egeimi et al. (2003), Egeimi and Pantuliano (2003), El Hassan and Birch (2008), Large and Suleiman El-Basha (2010) and Suliman (1999).

10 Civil society or international organisations are the ones recording disputes and small-scale violence, but often these go unrecorded. High-level tribal conflicts that involve violence are often the result of ethnic and political factors that are exacerbated by resource scarcities. For further examples of conflicts see Saeed et al. (2009a; 2009b), Siddig et al. (2007) and UNDP (2006).

- Babanusa and Al Salam villages, where competition over water is a source of conflict as farmers and pastoralists compete along the migratory route over water for farming, cattle and themselves (Sudan Environmental Conservation Society (SECS) 2010 cited in Bronkhorst 2011).
- Conflicts involving land as one factor, in Heiban between the Uturu, Tira, Lira, Shawaya and Heiban tribes (Bronkhorst 2011).
- Conflicts between the Birgid Awlad Hilal and Dar Bakhota tribes, from the Arabised Hawazma tribe from Southern Kordofan (Bronkhorst 2011).
- Conflicts between the Shanabla, landless camel nomads from Northern Kordofan, and the Nuba, over water and land (UNICEF 2004).
- Conflicts over land for grazing and farming, and water in North Kordofan, involving Baggara tribes from Southern Kordofan: tensions arise annually between the Gawamaa tribal group in Gagrur, and the pastoralists from the Se-beihat and Baggara (Egeimi et al. 2003).

The typology and the examples illustrate the relationship between pastoralist migration and conflict. Additionally, they show similarities with the broader literature on migration and conflict, with its focus on scarcity – farmers and pastoralists depend for their livelihoods on a suite of ‘critical resources’ (McLeman 2011) and natural or human-induced developments occur which make these resources scarce, increasing the likelihood of conflict. Certainly in Southern Kordofan, the typology also supports Reuveny’s (2007) thesis on the channels through which conflicts may arise as a result of migration, such as competition over scarce resources, compounded by ethnic and religious tensions, distrust between groups and including other socio-economic fault lines (Large & Suleiman El-Basha 2010).

What is causing resource scarcity?

Drawing on the work of Homer-Dixon (1998) and McLeman (2011), it is instructive to ask what is causing scarcities and (thinking back to the three ways a resource can become scarce) identify the types of scarcities dealt with. In Southern Kordofan, environmental degradation as a result of desertification, over-grazing and deforestation is a key issue causing a decrease in quality and availability of resources (Bronkhorst 2011; Saeed et al. 2009a; UNDP 2006). Shifting migratory routes as a result of the civil war, or because host areas are facing drought or have become degraded, means that available resources in other areas that need to accommodate additional people and livestock, are affected (Egeimi & Pantuliano 2003). Climate variability and change is another factor already mentioned.

Other scarcities are mostly of the third type – structural in nature – where resources become less available to some groups (Homer-Dixon 1998), which in turn causes scarcities elsewhere, when people need to find alternative land and water, having been excluded. In what follows in the next two sub-sections, it will be illustrated that these scarcities are often (partly or directly) the result of policies made at state and national level, and weaknesses in policy-making, governance and institutions at all levels. The concluding section will focus on the implications for considering pastoralism as a form of proactive climate change adaptation.

Land and mechanised farming policy and legislation

The post-colonial national government introduced a series of laws¹¹ (many of them related to land) and policies in the 1970s and 1980s that have created scarcities of grazing and farming land and water resources. Climate variability notwithstanding, these policies and laws had a devastating effect on the Nuba and the Baggara, destroying traditional symbiotic relationships between the two groups (Rottenburg 2008) based on the sharing and protection of resources. By causing displacement, landlessness, and by undermining customary land ownership¹², these developments also, as noted, led to large numbers of South Kordofanians joining the SPLM in the civil war (Keen 1994; Pantuliano 2007).

In regards to land legislation, the Unregistered Land Act of 1970 declared all unregistered¹³ (that is, communal land) government property and effectively abolished customary rights to land, paving the way for land seizures in favour of private investors (El Hassan & Birch 2008). The Civil Transaction Act of 1984 (which repealed the Act of 1970) made it even easier for elites to secure land to the detriment of rural people (Pantuliano 2007). Although the Act declared that registered usufruct rights to land are equal to registered ownership, a revision of the Act in 1991 prohibited the recognition of customary land rights in the courts (Keen 1994). Moreover, the 1974 Law of Criminal Trespass increased the power of leaseholders to prevent access by famers and pastoralists (El Hassan & Birch 2008) to what often used to be communally held land. The Investment and Ownership Land Act of 1990 further led to some traditional tribal areas being expropriated and becoming the property of private investors (Egeimi & Pantuliano 2003; Large & Suleiman El-Basha 2010).

11 For a detailed timeline of legislation introduced from the 1970s to 1990s which affected access to land for pastoralists and farmers, see El Hassan and Birch (2008).

12 See Bronkhorst (2011), Egeimi and Pantuliano (2003), Large and Suleiman El-Basha (2010), Saeed et al (2009a), Saeed (2009b) and Siddig et al. (2007).

13 Nearly all land in Southern Kordofan at the time was communally held. Some estimate that across the unified Sudan only 10% of land has been surveyed and registered (USAID 2010).

In regards to the pro-growth agenda supported by the World Bank, the aforementioned legislation (including the Mechanised farming Corporation Act of 1968 and the 1990 Encouragement of Investment Act) allowed for the formation of large mechanised farms across previously communally or tribally-held lands across fertile Southern Kordofan, the state's fertile Nuba Mountains and some other states, with most farms belonging to northern businessmen or those from Khartoum (Ayoub 2006; Egeimi & Puntaliano 2003; Saeed et al. 2009a). It is estimated that under this development policy the total area of mechanised farming increased fifteen times from 1970 to 2005 (Ayoub 2006).

The effects of the mechanised farming legislation and policies meant that in the state of Southern Kordofan and the Nuba Mountains in particular, expropriations were at the order of the day, and where land was not taken over into mechanised farms, it became the property of others (Large & Suleiman El-Basha 2010; Pantuliano 2007). Moreover, the government could use force to protect government land and lease holders were able to enforce the exclusion of pastoralists and farmers from newly-acquired land (El Hassan & Birch 2008). This especially affected agro-pastoralists' access to their homelands (*dars*), creating serious grazing and farming shortages among this group. In addition, traditional property rights were mostly destroyed, with few customary rights to land left for pastoralists – and thus to the utility and income from those lands (Ayoub 2006; Pantuliano 2007; UNDP 2006).

The mechanised farms also absorbed or blocked Baggara traditional migratory routes and the resources (such as water and grazing land for pastoralists' livestock) along those routes. This means that moving pastoralists had no choice but to encroach with their livestock on mechanised farms or small holdings, while at the same time those made landless as a result of legislation, started to farm on land traditionally set aside for grazing (Egeimi & Puntaliano 2003; Saeed et al. 2009a). According to Ayoub (2006: no pagination), this 'remains a major source of grievance and conflict, reinforcing feelings of neglect, marginalisation and social repression, as well as sealing off nomadic routes, water points and pastures, fostering a culture of land-grabbing and creating large landless groups'.

The 2004 Protocol between the Government of Sudan and the SPLM on the resolution of conflict in Southern Kordofan/Nuba Mountains and Blue Nile States¹⁴, preceding the CPA, calls for land commissions in Southern Kordofan and Blue Nile to address land ownership issues. Although these provisions and those contained in the CPA of 2005, were weak, it allowed for legal and political change in how the government treated majority land rights (Alden Wily 2010). Although major progress has been made in South Sudan, very little progress has been recorded in South Kordofan and the Blue Nile State. These states' governments have failed to recognise and legalise customary

14 Signed at Naivasha, Kenya, 26 May 2004. Available from: <http://www.iss.co.za/af/profiles/sudan/protnilemay04.pdf>

rights to land, or to establish the Land Commissions (the purpose of which were in part to address the injustices of the 1960s policies) (Alden Wily 2010). Some argue that this illustrates a clear lack of political will, marked by the continued allocation of customary land for external investors in Southern Kordofan (Alden Wily 2010).

That said, steps are reportedly being taken by the government to balance the needs of pastoralists and livestock routes (Bradbury et al 2006), such as through ‘freezing, repositioning and reallocating’ land in order to reduce the scarcity of grazing (UNDP 2006: 16). Other interventions include legislation to define livestock routes. However, there is very little capacity for enforcement (Saeed 2009a) or implementation of policies or even some presidential decrees on stock routes (Babiker 2011). At a state level, the implementation of policy or management of land is severely undermined by a critical lack of data and information on the pastoral system, land use and land use changes, as well as human and livestock population sizes (UNDP 2006). Even project documentation on past environmental and agricultural projects is lacking (UNDP 2006). For example, according to Saeed et al. (2009a), the last livestock census was in 1976, the last household income and expenditure survey in 1978 and it is nearly impossible to estimate the size of human and livestock populations. Moreover, there reportedly is no monitoring by the government of land use and land use changes, although NGOs and international organisations are compiling data but they often do not talk to each other. In addition, livestock routes are not defined and are in constant flux as a result of natural environmental change and other pressures (Saeed et al 2009a). Finally, the problems that beset government land administration on a local level mean that (corruption notwithstanding) documentation, land registry data and information are often lost; making the management and allocation of land, or securing of tenure rights highly problematic (Pantuliano 2007).

Traditional environmental and conflict management

For adaptation, in order to address scarcities arising from climate change and variability, the role of rural local institutions is critical. ‘Not only do institutions affect how households are affected by climate impacts, they also shape the ability of households to respond to climate impacts and pursue different adaptation practices, and mediate the flow of external interventions in the context of adaptation. The nature of access of different households and social groups to institutions and institutionally allocated resources is a critical factor in their ability to adapt successfully’ (Agrawal 2008: 16). Therefore, for successful adaptation, it will be critical to establish or strengthen institutions to manage resources equitably, address scarcities and to manage and prevent conflicts, especially in the case of pastoralism.

However, while institutions could also address and mitigate scarcities and prevent conflicts, they may also be affected by political developments. On Southern Kordofan, Rottenburg (2008: ix) argues that:

'conflicts between farmers and herders ... [are] related to the failure of modern state institutions, the misguided national policies, and to the state's distorted development strategies that disregard the interests and priorities of both the farmer and herder communities ... Such conflicts should not be called 'resource conflicts', 'oil conflicts', 'ethnic conflicts', 'racial conflicts', 'conflicts of interests between farming and herding' or 'climate conflicts'. The label should rather be 'conflicts caused by institutional failure'.

One such institution in Southern Kordofan, traditionally, the institution of the NA or traditional authorities of *sheikhs*, *omdas* and *nazirs*, played a critical role in the management of natural resources, livestock mobility, the separation of grazing and cultivation lines, and in conflict resolution between tribes. This traditional institution was relatively well placed to manage and address resource scarcities and any conflicts that may arise between and within tribes (Bronkhorst 2011) and arguably, if empowered, could even have mitigated some of the damage done by the land legislation and policies introduced by the central government. According to El Hassan and Birch (2008: 7 cited in Bronkhorst 2011), 'local [NA] orders stipulated the timing and direction of pastoral movements along the livestock corridors, the opening and closing of water points and the latest date for harvest, after which livestock could enter fields and graze the crop residues. Farming was forbidden in the corridors, and agreements were periodically facilitated between groups in order to head off conflict'. Another key aspect of the NA was that they were largely responsible for customary mediation or *judiyya*¹⁵. Customary mediation played a key role to address scarcities and prevent conflicts over scarce resources on a communal level and even is utilised to resolve larger inter-tribal conflicts in Sudan (Bronkhorst 2012).

However, another politically informed development in the 1970s led to the abolition of the NA. Although reinstated in 1980s, the NA is plagued by a host of challenges, including a lack of power and legitimacy, the rise of and militarisation of youths, political interference and a lack of technical capacity to deal with recent ecological and political challenges (Wadi et al. 2005). Moreover, as mediators were selected from native administrators, after the abolition of the NA a great vacuum was left, especially in terms of resource management and conflict resolution. Although the Sudanese government instituted measures to replace the functioning of the NA, there seems to be consensus that this was not a great success, mainly because of weak capacity at a local level, a lack of coordination and overlap between different sectors of government for local affairs (Elhusein 1989). A major drawback was the administration of local affairs which was left to no one. It is likely that these difficulties contributed to the NA's reintroduction but by then the damage was done, and the native administrators have not been able to achieve the same legitimacy and power, and therefore ability to manage scarce resources, as they did in the past (Wadi et al 2005). It is also the case that the most powerful role (that of *nazir*) was not restored – according to some part of the

15 For a detailed discussion of the practice of *judiyya* in relation to resource management in Sudan, please refer to Bronkhorst (2012).

manipulation of local powers by government in order to retain support for its pro-Islamisation policies (Al-Hardullu & El Tayeb 2005).

While there is promising evidence that traditional authorities are being strengthened and reintroduced in Sudan¹⁶ (Bronkhorst 2011; Sudan Vision 2011), and that in some instances state governments have delegated authority to native administrators to manage resources, political interference is a significant challenge. According to Bradbury et al. (2006: 14) this interference results from 'negotiation between local and national powers'. Manipulation by the government of tribal institutions and authorities is thus further undermining its legitimacy and the role it can play in managing resources and resolving conflicts between different groups. Since June 2011, a number of native administrators and traditional leaders have allegedly been killed in the state¹⁷ (Sudan Vision, 2012), highlighting the political nature of native administrators in post-secession Sudan.

Implications for pastoralism and adaptation

The preceding section illustrates that government policy and legislation have systematically excluded farmers from land, and pastoralists from resources critical to pastoral production, and undermined one institution that has shown the potential to manage those resources or the conflicts arising from competition over the resources. With Southern Kordofan presenting excellent agricultural potential in an otherwise arid nation¹⁸, policies and legislation have benefited the wealthier and well-connected from the north, at the disenfranchisement of farmers and pastoralists, without the creation of livelihood alternatives to those affected. It is likely that while development and class considerations played a critical part in the government's actions, political considerations are important – least of all addressing the fact that the Nuba represented a powerful non-Arab grouping occupying an (agriculturally and politically) strategic region in Sudan.

Homer-Dixon (1998) argues that this type of structural scarcity can be caused by and causes 'resource capture' and 'ecological marginalisation'. Resource capture is when 'powerful groups within a society recognise that a key resource is becoming more scarce (due to both supply and demand pressures) and use their power to shift in their favour the regime governing resource access. This shift imposes severe struc-

16 Nafie to address the Native Administration conference in Southern Kordofan, Sudan Vision, 8 August 2011. Accessed 27 December 2011, <http://news.sudanvisiondaily.com/details.html?rsnpid=197673>

17 SPLM assassinates tens of political, religious and tribal leaderships in South Kordofan State, Sudan Vision, 2 January 2012. Accessed 22 January 2012, <http://news.sudanvisiondaily.com/details.html?rsnpid=204311>

18 In light of the post-colonial political context, the former southern Sudan is excluded from this analysis.

tural scarcities on weaker groups' (Homer-Dixon 1998: 209). However, the effects of scarcities in one area are also pushing both pastoralists and farmers into areas that may not be optimal for sustaining livelihoods, while increasing scarcities. This ecological marginalisation 'occurs when a structural imbalance in resource distribution joins with rapid population growth to drive resource-poor people into ecologically marginal areas' (Homer-Dixon 1998: 209). While population growth is not at question here, pastoralists not only face artificially created scarcities in their homelands, but also along migration routes and in receiving areas. The tragedy is also that due to these increasing pressures certain areas are turned into ecologically marginalised areas through desertification and over-use.

If the Sudanese government continues with the commercialisation and privatisation of large tracts of arable tribal land, without following a clear overriding policy that balances the objectives of commercial farming with pastoralism, and that of small holders, conflict is likely to continue between these actors. For pastoralism generally and as a form of adaptive migration to succeed, land for grazing and water for animals and livestock are critical, and privatisation or a lack of management of those resources cut pastoralists off from the resources, which creates scarcities and competition elsewhere.

Moreover, institutions are critical to manage and negotiate common pool resources and scarcity, both in receiving communities but also en route, and possibly even manage negotiated access to privately held property. In the context of the outlined government weaknesses there seems to be very little local government can do in this regard in the short-term, especially in light of recent political developments in Southern Kordofan. The good news is that in areas where the NA still functions, and where it has the power, legitimacy and resources to address scarcities and manage conflicts, it has been successful. Also, work in Southern Kordofan by the government, non-government and international actors to address pastoral-farmer conflicts draw extensively on traditional conflict resolution mechanisms and include the strengthening of traditional authorities as a key aim (Bronkhorst 2011). If traditional institutions elsewhere in the state are not strengthened – either because they have been irreversibly destroyed or there is no political will – they need to be replaced by functioning modern systems for resource and conflict management. At the very least, however, until the state government can further develop its capacity to manage resources and conflicts, the NA presents a possible avenue or interim measure through which resources could be managed, negotiated and conflicts can be resolved.

The broader question this Chapter raises for Sudanese policymakers, and for which it does not have an answer, is that when people are dependent on land, and when climate change and variability make that land uninhabitable or unproductive for a known or unknown period every year, how should that particular scarcity be managed? This is a critical question because if there is no appetite in Sudanese policy (or political) circles for a form of managed seasonal migration or pastoralism as a livelihood sys-

tem, how will the areas in the north that will become more inhospitable be managed in future? What would be the best use of that land, and how would the government ensure livelihoods or find alternatives in that context, if seasonal migration is not an option? Moreover, in the context of climate change, other environmental pressures, higher population sizes, and insecure land tenure, how can the government balance the benefits of seasonal migration with objectives for economic growth and commercialisation of agriculture?

The Sudanese government and state government of Southern Kordofan thus face a conundrum – if it considers pastoralism an appropriate form of proactive migration and thus adaption, it needs to address the critical issues that create conflicts between farmers and pastoralists. It is not a job that can be done half way. As the case of Southern Kordofan demonstrates, climate change adaptation notwithstanding, there is a need for overall frameworks of policy, legislation, implementation and administrative structures that function and have the capacity to function from national to local levels. These frameworks should balance the objectives of economic growth and development, with pastoralism, farming and with measures on climate change adaptation. This Chapter demonstrates that it is not sustainable for policies to be in competition or favour small elite groups, but require a level of complementarity that can accommodate competing claims for increasingly scarce resources. Critically, the management of pastoralism and adaptation, if it is done well, and even the monitoring and management of conflicts between pastoralists and farmers (if that is also done well), require capacity and resources. Without investments in strengthening the information, resources and skills base for adaptation and pastoralism (e.g., policy development, implementation and administration), it is unlikely that policies that encourage pastoralism as a form of adaption will be successful.

Conclusion

Pastoralism presents a possible proactive response to climate change. While climate change is predicted to lead to resource scarcity in Sudan, non-climatic factors presently contribute to scarcities and conflicts between pastoralists and farmers. This Chapter found that structural scarcities have been created through the introduction of legislation on land and mechanised farming. It also argued that policies have undermined the traditional institution of the NA, which has demonstrated the potential to manage resources, scarcities and any conflicts arising from competition over resources. These present critical issues that need to be addressed if pastoralism is to be promoted as a proactive response or form of adaptation to climate change in Southern Kordofan.

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On raids and relations: Climate change, pastoral conflict and adaptation in north-western Kenya

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Abstract

Turkana in northern Kenya is highly vulnerable to climatic changes. More frequent and prolonged droughts in combination with socio-economic developments and the availability of small arms have increasingly overwhelmed existing adaptive capacities. Under these conditions inter-pastoral conflicts, which are closely related to violent livestock raiding, tend to increase. This Chapter analyses possible linkages between climate change and livestock raiding in Turkana, with a view to discuss options for adaptation and to provide policy recommendations to mitigate conflicts. To achieve these aims, climate data in conjunction with conflict records is analysed, supplemented by extensive qualitative field research conducted in 2011 and by climate projections. Based on the findings, the 'Resource Abundance and Scarcity Threshold' (RAST) hypothesis is developed, which could explain contradictory findings between the occurrence of raiding during periods of resource scarcity and during periods of resource abundance. Several options for adaptation to changing climatic conditions exist. Ensuring free and safe pastoral mobility especially across international borders is particularly important. To address the conflicts directly, inter-communal conflict prevention and resolution mechanisms need to be strengthened. Failure to mitigate the conflicts increases the vulnerability of the pastoral communities to a warmer and less predictable climate which could lead to more raiding.

Keywords: climate change, raiding, conflict, pastoralism, adaptation, vulnerability, Kenya

Introduction

In 2011, the Horn of Africa experienced its worst drought in 60 years (OCHA 2011c). Droughts predominantly affect pastoralists as they are most vulnerable to climatic changes. Their vulnerability consists of three elements: climate change exposure, sensitivity and adaptive capacity (IPCC 2007b). Climate change exposure is the rate and magnitude of climatic changes that a region is exposed to (IPCC 2007b). In East Africa climate change is characterised by increasing temperatures and higher rainfall variability (Christensen et al. 2007; McSweeney et al. 2008), with both escalating the likelihood of more frequent and extended droughts (Few et al. 2006; WBGU 2007). Sensitivity is 'the degree to which a system is affected, either adversely or beneficially, by climate variability or change' (IPCC 2007a: 881). Pastoralists are sensitive to climatic changes because their livestock depends on the availability of water and pasture which is negatively affected by climate change. Adaptive capacity relates to available knowledge, skills, options and assets to adapt to climatic changes (see also Adger 2006; IPCC

2007a). While pastoralists have developed their adaptive knowledge and skills over centuries, their options for adaptation and economic assets have been limited by political and socio-economical marginalisation (GoK 2007; McSherry & Brass 2008).

In Turkana, northwest Kenya, the combination of marginalisation and more frequent and prolonged droughts has increasingly overwhelmed the existing adaptive capacity of the pastoral communities (GoK 2008; Mkutu 2008; OCHA 2011a; UNDP 2011). Concurrently, violent conflicts have increased among different groups including the Turkana of Kenya, the Tepeth and Matheniko of Uganda, the Merille of Ethiopia and the Toposa of South Sudan (UNDP 2011). These conflicts occur when communities do not settle their opposing views about pasture, water and livestock peacefully but with the use of force (Butler & Gates 2012; Kaimba et al. 2011). The conflicts are closely related to violent livestock thefts called raids (cf. Eaton 2008a; Eaton 2008b; Witsenburg & Adano 2009). These raids are often both a cause and an expression of conflict (Hendrickson et al. 1998; USAID 2002). On the one hand, raids lead to distrust between communities which is a key ingredient for conflict (Mwangi 2006; Schilling et al. 2012b). On the other hand, communities express their hostility toward other communities by raiding them (Eaton 2008a; Eaton 2008b). These relations between conflict and raiding are not a new phenomenon (Schilling 2012). However, in recent decades the introduction of small arms has turned the cultural practice of livestock raiding into a deadly and destructive activity (Mkutu 2008; Mwangi 2006).

The parallel occurrences of intensified conflicts and prolonged droughts have led to media reports suggesting a direct link between climate change and conflict¹. Yet, scientifically, the impact of climate change on conflict in general (see Scheffran et al. 2012a; Scheffran et al. 2012b) and in Kenya in particular is far from fully understood. Some studies have identified influences of deviations in resource availability on conflict, both related to climate change (Adano et al. 2012; Campbell et al. 2009; Schilling et al. 2011; Witsenburg & Adano 2009) and unrelated to climate change (Meier et al. 2007). Others have attributed conflict to the commercialisation of raiding (Buchanan-Smith & Lind 2005; Krätli & Swift 2003), poverty (Omolo 2010), payment of dowry and accumulation of general wealth (Bollig 1993; Hendrickson et al. 1998), retaliation (Eaton 2008b), tribal-based politics (McCabe 2004) and the availability of small arms (Gray et al. 2003; Mkutu 2006).

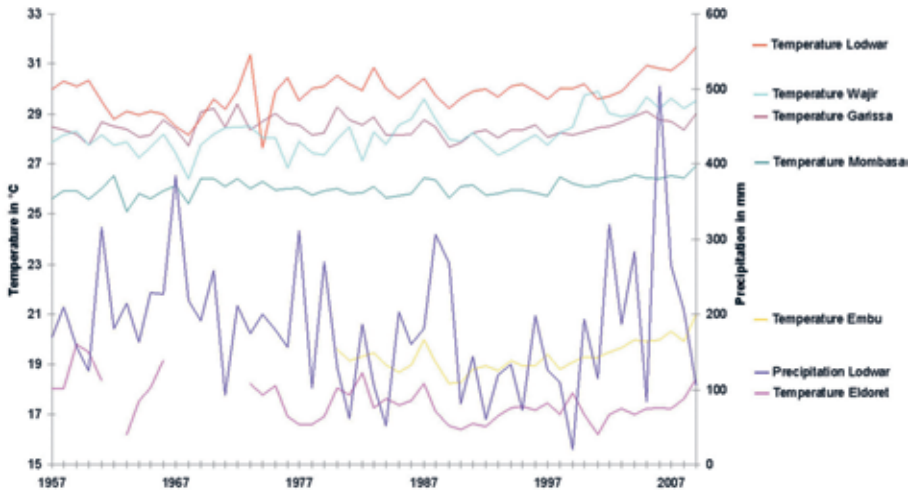
This Chapter pursues two aims. First, to analyse potential linkages between climatic conditions and livestock raiding in Turkana. Second, to discuss options for adaptation to reduce vulnerability to climatic changes. Before these are addressed, climate change and its linkages to conflict in Kenya are reviewed in general terms. Additionally, the methods and case study region are introduced. The last section of the Chapter draws conclusions to provide policy recommendations.

1 Cf. The first climate change conflicts, *Guardian*, 23 November 2009. Accessed 23 June 2011, <http://www.guardian.co.uk/journalismcompetition/professional-climate-change-conflicts/print>

Climate change in Kenya

Located on the equator, Kenya has a mostly temperate climate in the interior, a semi-arid to arid climate in the north and a tropical climate along the coast (Central Intelligence Agency, CIA 2012; McSweeney et al. 2008). The highest temperatures are reached in north Kenya (Kabubo-Mariara 2009). According to the IPCC, temperatures in Kenya have risen by 1°C over the past 50 years (Christensen et al. 2007). Looking particularly at the highlands, Pascual et al. (2006) find a significant warming trend of 0.5°C since the end of the 1970s. This trend is in line with on-ground measurements. Figure 1 shows temperature curves from six weather stations across Kenya. The highest temperatures are found in Lodwar, which is located in the northern county of Turkana (see Figures 1 and 3). The entire country is warming at a rate roughly 1.5 times the global average (Christensen et al. 2007). This rate is projected to lead to temperature increase in East Africa of up to 2.8°C until 2060 and up to 4.5°C until 2100 compared to 1900 (Christensen et al. 2007; Doherty et al. 2009).

Figure 1: Temperature and precipitation between 1957 and 2009 in selected locations in Kenya

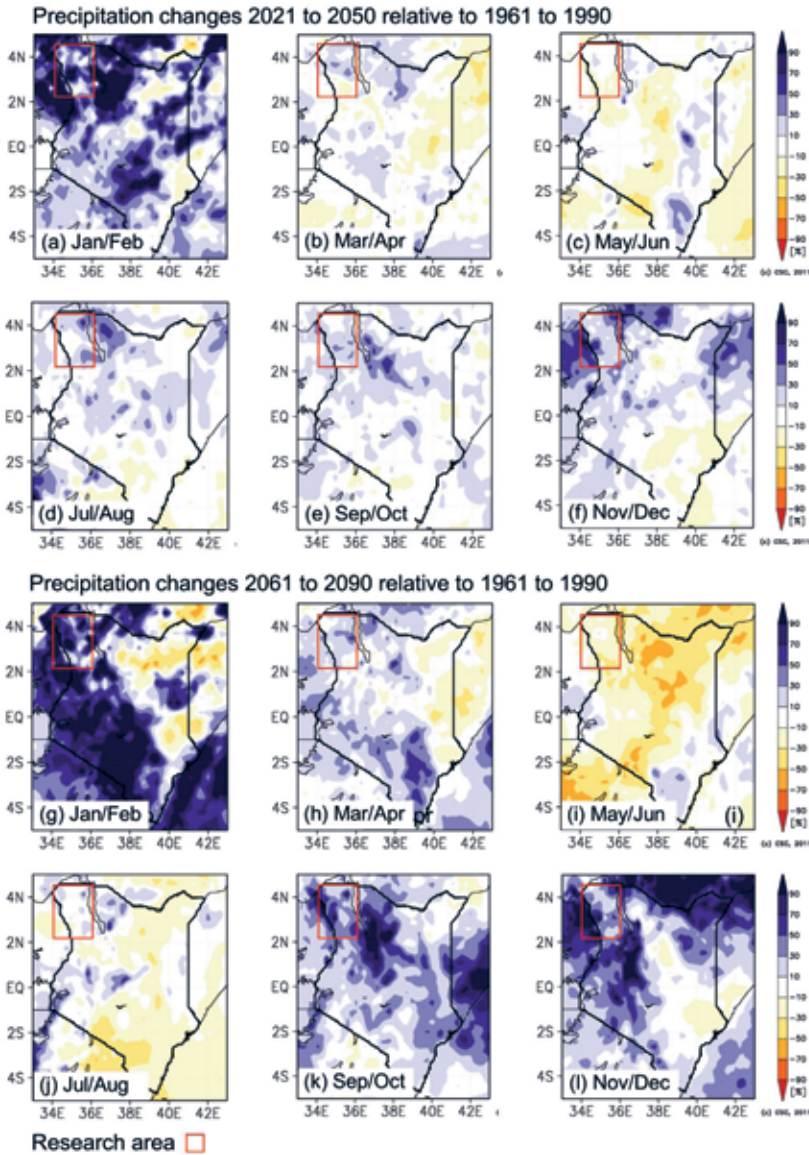


The locations of the towns are shown in Figure 3

(Source: Own representation based on data from metrological station, accessed through Royal Netherlands Meterological Institute 2000; Tutiempo 2011)

In terms of precipitation, most of the annual rainfall of about 687 mm is recorded during the long rains from March to May and the short rains from October to December (McSweeney et al. 2008). No statistically significant rainfall trend can be observed since 1960 (Figure 1 and Eriksen & Lind 2009). However, the proportion of rain falling in heavy rainfall events has increased (McSweeney et al. 2008). These heavy rainfall

Figure 2: Projections of relative changes in precipitation in Kenya 2021 to 2050 (a through f) and 2061 to 2090 (g through l) compared to 1961 to 1990 for two months intervals (simulations specified by the authors and conducted by Andreas Hänsler of the Climate Service Centre Hamburg in 2011)



The projections are based on the IPCC emissions scenario A1B (see IPCC 2000). For a detailed description of the modelling method see Hänsler et al. (2011).

events are projected to occur more often, resulting in a higher total amount of rainfall and an increase of intra- and inter-annual rainfall variability (Christensen et al. 2007; McSweeney et al. 2008). The projected rainfall variability for Kenya is illustrated in Figure 2 which shows strong precipitation increases in January/February (plot a and g) and precipitation decreases in May/June (plot c and i) for the periods 2021 to 2050 and 2061 to 2090 relative to the baseline period of 1961 to 1990.

Implications of climate projections for pastoral communities

In general, pastoralists potentially benefit from higher total rainfall amounts as the availability of water for livestock and pasture is increased. However, it does not only matter how much rainfall is received but also when. Strong rainfall events followed by extended dry periods increase the likelihood of floods and droughts, especially in combination with the strong warming trend (Few et al. 2006; WBGU 2007; Williams & Funk 2011).

Droughts are not a new phenomenon in Arid and Semi Arid Lands (ASALs), which make up 80% of Kenya's land area (GoK 2007). However, the drought frequency has increased. In northern Kenya 28 major droughts have been recorded in the past 100 years. Four of them occurred in the last decade (Mude et al. 2010). The increased drought frequency gives pastoralists little time to recover from drought-related livestock losses (Huho et al. 2011). The increased inter- and intra-annual rainfall variability decreases the predictability and reliability of precipitation and resource availability. Hence, the projected climatic changes are likely to have mostly negative effects on pastoral communities.

Climate change and pastoral conflicts in Kenya

A number of studies have examined climatic and environmental factors as drivers for conflict in Kenya. While all recent studies find a mostly indirect link between climatic and/or environmental factors and the occurrence of violence, two lines of argument can be distinguished. The first line of argument draws on Homer-Dixon's scarcity theory in which resource scarcity (in the Kenyan context mostly caused by drought) increases the likelihood of violence (see Campbell et al. 2009; Doti 2010; Eriksen & Lind 2009; Meier et al. 2007; Mkutu 2008; Njiru 2012; Omolo 2010; Temesgen 2010). Campbell et al. (2009: 6) for example summarise that 'climate change is one of a range of factors causing natural resource scarcity, while natural resource scarcity is one of a range of factors causing conflict'.

In contrast, the second line of argument suggests that a higher level of violence is associated with more rainfall and hence increased resource availability or abundance (see Adano et al. 2012; Eaton 2008a; Kennedy et al. 2008; Raleigh & Kniveton 2010; Theisen 2012; Witsenburg & Adano 2009). For instance, Theisen (2012) as well as Raleigh and Kniveton (2010) find a positive statistical correlation between higher pre-

precipitation and violence. Furthermore, Witsenburg and Adano (2009: 723) explain that 'raiders like to attack during wet years because of high grass, strong animals, dense bush to hide in and the availability of surface water, which makes it easier to trek with the animals'. This is supported by Adano et al. (2012). Additionally, Eaton (2008a; 2008b) argues that during drought pastoralists cannot engage in raiding as they are too occupied with keeping their own livestock alive.

In summary, climate change altering the resource availability seems to play a role in the occurrence of raiding and conflict, especially in pastoral areas. Yet, the existing theories of resource scarcity and resource abundance provide opposing explanations. This suggests that matters are more complex and that new explanations are needed. After introducing the research area and the methods, the following sections address this need by analysing the influence of climatic conditions on raiding in Turkana.

Research area and methods

Turkana is located in the northwest region of Kenya, which shares international borders with Uganda, South Sudan and Ethiopia (see Figure 3). A temperature range between 24°C and 38°C (mean 30°C) and low precipitation levels result in a mostly arid to partly semi-arid climate and a landscape characterised by shrubland, savanna and desert (GoK 2008). The average annual rainfall ranges from about 430 mm in the northwest to less than 120 mm in the central plains around Lodwar. Most of the erratic and unreliable rainfall is received between March and May (long rains) and between October and December (short rains) (GoK 2008; McSweeney et al. 2008). Besides the major rivers, Turkwel and Kerio, Lake Turkana is the only significant and permanent source of water which suffers from salinisation and decreasing water levels (GoK 2008).

In addition to the limited and strongly varying resource basis, Turkana has experienced significant political marginalisation by the central government in Nairobi which has failed to provide the region with basic services such as access to education and health services (GoK 2007; McSherry & Brass 2008). With a per capita Gross Domestic Product (GDP) of US\$171 (UNDP 2006) and a Human Development Index (HDI) of 0.333 (UNDP 2010), Turkana is the poorest and least developed county in Kenya². Around 75% of the population in the region relies upon food aid for their livelihoods (USADF 2011). Most of the 855 400 people living in Turkana are pastoralists (Commission on Revenue Allocation 2011; Juma 2009). Besides the Turkana, the county hosts many communities including Dodoth, Matheniko, Pokot and Jie from Uganda, Toposa from South Sudan, and Nyangatom and Merille from Ethiopia (OCHA 2010a).

2 Omari E, Named: Kenya's richest and poorest counties, Daily Nation (Nairobi), 17 December 2011.

These groups periodically engage in violent conflicts over resources (Mkutu 2008; UNDP 2011).

To analyse possible linkages between these conflicts and climate change, a dual method which consists of a qualitative and a quantitative component is applied. One hundred and seventy-two persons, including community members (raiders, pastoralists, elders, chiefs and women) as well as representatives of governmental and non-

Figure 3: The Turkana research area and selected locations in Kenya



(Source: Own representation based on data from Maplibrary 2007)

governmental organisations (NGOs) were interviewed in Kenya and Uganda in 2011 over a period of five months. Most interviews were conducted in and around the villages of Lokirama and Loya (Figure 3). The overall objective of the interviews was to gain an understanding of the raid-related conflicts, vulnerability and adaptive capacity of the communities in Turkana and its border region.

The aim of the quantitative analysis was to determine whether any of the linkages between climate change and conflict which were proclaimed by the interviewees, are reflected in the data. To achieve this aim, conflict data was analysed in conjunction with climate data. The conflict data was taken from the Turkana Pastoralist Development Organisation (TUPADO 2011) incident register which covers raiding incidents in Turkana from 2000 up to today. Raiding in the context of this Chapter refers to the mostly violent theft of livestock from one group by another (see also USAID 2002).

The analysis is based on the period 2006 to 2009 as the reporting in the other years is not consistent. The TUPADO register uses a variety of sources ranging from peace committee members and local authorities (e.g., district commissioners and area councillors) to representatives of NGOs and local media.³ The climate data was taken from the meteorological station in Lodwar, the only synoptic station in Turkana, recording temperature and precipitation values eight times per day since 1919 (GoK 1999). This data was accessed through a public platform which provides daily values since 1957 (see Tutiempo 2011).

Analysis and discussion of climate change and raiding in Turkana

Table 1 shows the decreasing trend of annual precipitation in Lodwar. The temperature has increased by almost one degree between 2006 and 2009. The number of raids was lowest in 2007 and highest in 2009.

Table 1: Precipitation, temperature and number of raids in Turkana between 2006 and 2009

	2006	2007	2008	2009
Total annual precipitation (in mm)	503	265	206	105
Mean annual temperature (in °C)	30.8	30.7	31.1	31.7
Raids per year	58	31	72	122

(Source: Own representation based on data from TUPADO 2011; Tutiempo 2011)

3 Interview with Johnstone Ekamais of TUPADO on 20 September 2012.

The average number of 71 raids per year (six raids per month) reflects the high level of insecurity expressed by the interviewees⁴ and organisations (see Schilling et al. 2012b; OCHA 2010b; OCHA 2011b). On average two people died per raid over the four years considered.

To analyse possible linkages between climate conditions and raiding, precipitation and temperature were correlated with the number of raids, the average number of raiders per raid and the number of livestock stolen, finding no consistency in the few higher correlation coefficients (Table 2). The only distinctive feature is that in 2006 all precipitation correlations are positive and in 2009 they switch in sign. For temperature, all signs are negative in both years. Yet, overall the values of the coefficients are statistically not significant.

Table 2: Correlation between climate and conflict data

Correlation of precipitation and ...	2006 – 2009	2006	2007	2008	2009
number of raids	-0,08	0,11	-0,03	0,44	-0,25
average number of raiders per raid	0,16	0,09	0,68	-0,09	-0,29
number of livestock stolen	0,00	0,17	-0,18	0,09	-0,39
Correlation of temperature and ...					
number of raids	0,16	-0,02	0,14	0,40	-0,57
average number of raiders per raid	-0,25	-0,32	-0,14	-0,27	-0,12
number of livestock stolen	0,09	-0,29	0,25	0,05	-0,27

(Source: Own representation based on data from TUPADO 2011; Tutiempo 2011)

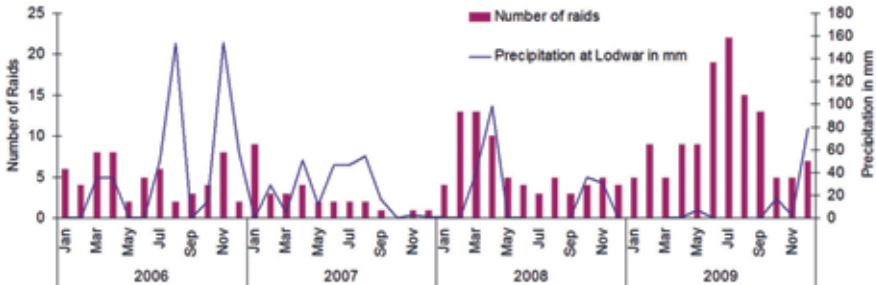
No distinctive features were found when plotting monthly temperature values against the listed set of variables. The analysis therefore focused on precipitation which most strongly determines the availability of water as well as the amount, distribution, and quality of pasture (Birch & Grahn 2007; Witsenburg & Adano 2009).

Precipitation and raiding

Figure 4 shows the number of raids per month plotted against precipitation. The years 2006 and 2008 can in part be explained by Witsenburg and Adano’s (2009) theory that raiding increases during periods of increased rainfall. Yet, there are several months (January, February, May, June and September of 2006 as well as January and May through September of 2008) without rain while raiding continued.

4 For example interview with Samuel Ekal of TUPADO on 24 March 2011.

Figure 4: Precipitation and monthly number of raids in Turkana between 2006 and 2009



(Source: Own representation based on data from TUPADO 2011; Tutiempo 2011)

The raiding in the months preceding the regular long rains (March to May) and regular short rains (October to December) could be explained by raiders anticipating the rain. ‘During drought nobody is interested because the animals are dying anyway but when the rains are about to come [...] that is the time when those whose livestock has died will want to restock and try to multiply and raid’⁵. But even when the momentum of anticipation is included, Witsenburg and Adano’s (2009) ‘rains and raids’ theory does not hold true for the period June through August of 2007 which shows an unusually high level of precipitation in combination with a low level of raiding activity.

The plots of 2009 stand in even stronger contrast to the resource abundance theory. While precipitation was by far the lowest compared to the other three years, the number of raids was by far the highest. This development supports the notion of the resource scarcity theory which identifies the scarcity of resources as a major driver for conflict as previously discussed.

Similar to the opposing findings in the data, several interviewees stated that raiding mostly occurs before and during rainy seasons while others stressed that people mostly raid during times of drought⁶. These interviewees argued that during dry periods raiding is not only used to restock herds but also as a means to secure or gain control over watering points and pasture. In this respect, the two theories of resource abundance and resource scarcity seem contradictory. However, they can be combined in the complementary ‘Resource Abundance and Scarcity Threshold’ (RAST) hypothesis. In regular years with sufficient rain, raiding is mostly conducted before and during the long and short rains to make use of the fortunate raiding conditions (healthier animals, vegetation providing cover, own herds need less attention). But when rains partly or completely fail and a certain threshold of resource scarcity is reached, raids are conducted

5 Interview with Augusta Muchai of the Institute for Security Studies on 4 March 2011.

6 For example interview with Joseph Akoule of Sikom on 18 March 2011.

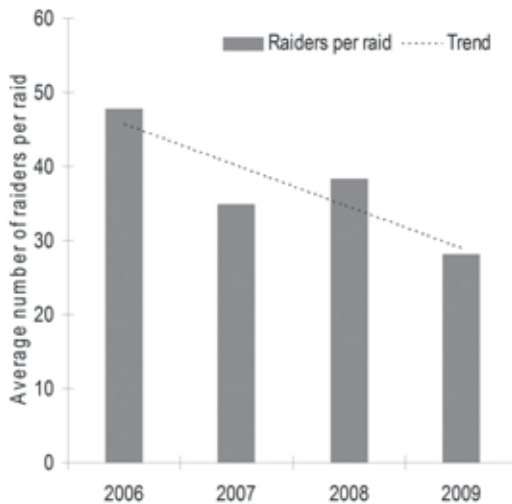
despite the less fortunate restocking conditions not only to compensate drought-related livestock losses but to protect or gain control over scarce pasture and water resources. Indeed the hypothesis is based on a limited period of time but it matches the statement of most interviewees who reported that the raiding during rainy season differs from the one in dry season. While the rainy season is used for restocking herds, raiding in dry periods is mainly an instrument to control or gain access over resources.

The RAST hypothesis could be instrumental to understand a recent finding by Raleigh and Kniveton (2012). The authors conclude that in East Africa ‘higher rates of rebel conflict will be exhibited in anomalously dry conditions, while higher rates of communal conflict are expected in increasingly anomalous wet conditions’ (Raleigh & Kniveton 2012: 51). Here too, the rebel’s effort to gain control over land is strongest in drier periods while the communal conflict, closely related to the violent acquisition of livestock, takes place during periods of increased rainfall. Aside from the possible linkages between climate conditions and conflict, the analysis of the raiding data raises findings related to further developments.

Commercialisation of raiding

The raiding data supports a shift mentioned by the interviewees⁷: the shift from fewer but larger raids (so called ‘mass raids’) to more frequent raids with a smaller number of raiders (Figure 5).

Figure 5: Number of raiders per raid in Turkana between 2006 and 2009



(Source: Own representation based on TUPADO 2011)

7 For example interview with Raphael Locham of Reconcile on 14 March 2011.

This shift is likely to be part of the larger development of commercialisation of raiding which refers to ‘an aspect of the wider integration of pastoralists within a market economy’ (Krätli & Swift 2003: 8). In other words, the stolen livestock is not used to keep it and restock herds but to sell it to a trader or directly on a livestock market for cash (Eaton 2010). The practice of commercialisation extracts significant livestock numbers from the traditional cycle of communities raiding each other to restock (Buchanan-Smith & Lind 2005; Mkutu 2010). Between 2006 and 2009, northwest Kenya experienced a net loss of livestock of more than 90 000 animals in raids according to the Conflict Early Warning and Response Mechanism (CEWARN 2010).

Small arms and raiding

Regardless of the type of raiding, raiding itself is reported to have become more violent⁸. In the period considered here, the number of deaths and injured during raids rose from 139 and 27 in 2006 to 190 and 80 in 2009 (TUPADO 2011). While the cause of death is not listed in the TUPADO register, the ratio between people killed and injured could point to an increased use of semi and fully automatic small arms (see also Mkutu 2008). Most often mentioned in the interviews were G3 rifles and AK47s. The arms mostly enter Turkana from Uganda, Ethiopia and South Sudan. Fewer are said to come from Somalia⁹. The price of AK47s has decreased over the past decades while the price of the bullets has risen.¹⁰ Summarising the role of small arms in raiding, Joseph Elim from the network of civil society actors Riam Riam states: ‘The power is not in the person, the power is the weapon’¹¹. Mukutu even argues that armed raids have replaced ‘the traditional unity among pastoralists’ (Mkutu 2008: 148). So far, all disarmament efforts have failed and even undermined the communities’ trust in the involved governments, as these were incapable of fully disarming all conflicting communities simultaneously and preventing rearmament (Knighton 2010; Mkutu 2008; USDS 2011; Wepundi et al. 2011). If the government of Kenya is incapable of disarming the region, and both climate exposure and sensitivity are beyond the government’s control, what can be done to decrease the vulnerability of the region? A promising and practically feasible approach is to strengthen the adaptive capacity of the local population. For this purpose, the next section explores options for adaptation and their implications for vulnerability and conflict.

8 For example interview with Joseph Akoule of Sikom on 18 March 2012.

9 Interview with Lucas Akeru, Chief of Lokiriama on 22 March 2012.

10 The price ranges for a AK47 bullet differed from KSH200 to 300 (US\$3.2) to about KSH50 to 100 (about US\$1). An AK47 was said to cost about KSH40 000 (about US\$430) to 70 000 (US\$750). These numbers were given during interviews with Peter Limaris of the Arid Lands Resource Management Project on 16 March 2011, MC Kimani of the Institute for Security Studies on 29 March 2011 and Joseph Elim and Patrick Imana of Riam Riam and Alliance for Pastoralist Development on 21 March 2012.

11 Interview with Joseph Elim of Riam Riam on 21 March 2011.

Options for adaptation and their implications

Pastoralism is a well-suited livelihood for Turkana as it has evolved over centuries, making efficient use of the erratic and harsh climatic conditions (Birch & Grahn 2007). The traditional response to a decreasing resource base is to expand the existing grazing range and/or adjust the wandering of herds (Omolo 2010). Both imply interaction with neighbouring and distant groups. The interaction can have a cooperative character in the form of reciprocal grazing arrangements which can strengthen ties between different groups (Eriksen & Lind 2009). To enable cooperative ties across international borders, legal agreements with Kenya's northern neighbouring states are needed to ensure that pastoralists can move freely and safely. In a second step, grazing arrangements could be supported by weather forecasts (Luseno et al. 2003). However, expansion of the existing grazing range can also be conflicting, especially when loose grazing associations are formed. In these so called 'arumrum', 'up to a few hundred households' (Eriksen & Lind 2009: 830) come together to enter insecure areas. This often contributes to conflict as other communities perceive it as an 'invasion' of their land (interviews with raiders, see also Kaimba et al. 2011).

Further, already used options of adaptation are shown in the upper part of Figure 6 (for a comparison with North Africa see Schilling et al. 2012a). The herd composition can be adjusted by replacing cattle with more drought resistant goats and camels (Opiyo et al. 2011)¹². The government could subsidise this shift. In times of fodder scarcity, pastoral communities slaughter their weakest animals as the healthier ones have a better chance of surviving times of underfeeding¹³. The government's response to drought has been predominantly to encourage the selling of livestock through large buy-off campaigns (Njiru 2012). On the one hand, this gives pastoralists the opportunity to realise some income with their dying livestock. On the other hand, the price offered by the government during droughts is significantly lower than the market price during times of regular fodder availability¹⁴. Hence, the pastoralists lose a significant share of their herd during droughts. Especially when these losses are not sufficiently buffered by social networks (see de Vries et al. 2006; Juma 2009) or insurances (Chantararat et al. 2007), drought can increase the pressure to raid in order to secure the few resources left and the pressure to restock when resources are available again (see previous section).

Especially women can diversify the income sources of a household by weaving baskets or mats (Oba 2001). However, as only few markets exist in Turkana, the women mainly depend on traders who can to a large extent dictate prices (Eriksen &

12 For an example of the shift in livestock see Oesterle (2008). Oba (2001) and McCabe (2004) describe the impact of drought on cattle numbers.

13 Interview with Elel Losike of Turkana community on 29 September 2011.

14 Interview with Iria Lomali of District Livestock Marketing Council Turkana on 10 October 2011.

Lind 2009). Donkeys, usually not used as a food source (milk, meat, blood), offer another income source for women who do not move with the livestock but stay with the young children in villages (Njiru 2012). Here, water, food and firewood are needed on a daily basis but are often not available in close proximity to households. Hence, there is potential for women to start a small business based on the transport capacity of donkeys (see Fernando 2002; Ochieng & Wanja 2008). Villagers seeking to transport goods can pay donkey owners for accompanying them with their donkey. This type of small-scale business seems promising in Turkana where the road infrastructure is poor and the use of motorised vehicles is limited. However, it is difficult to ensure that the service is not misused to facilitate the trafficking of small arms and other illegal goods across the porous borders to Uganda, Ethiopia and South Sudan.

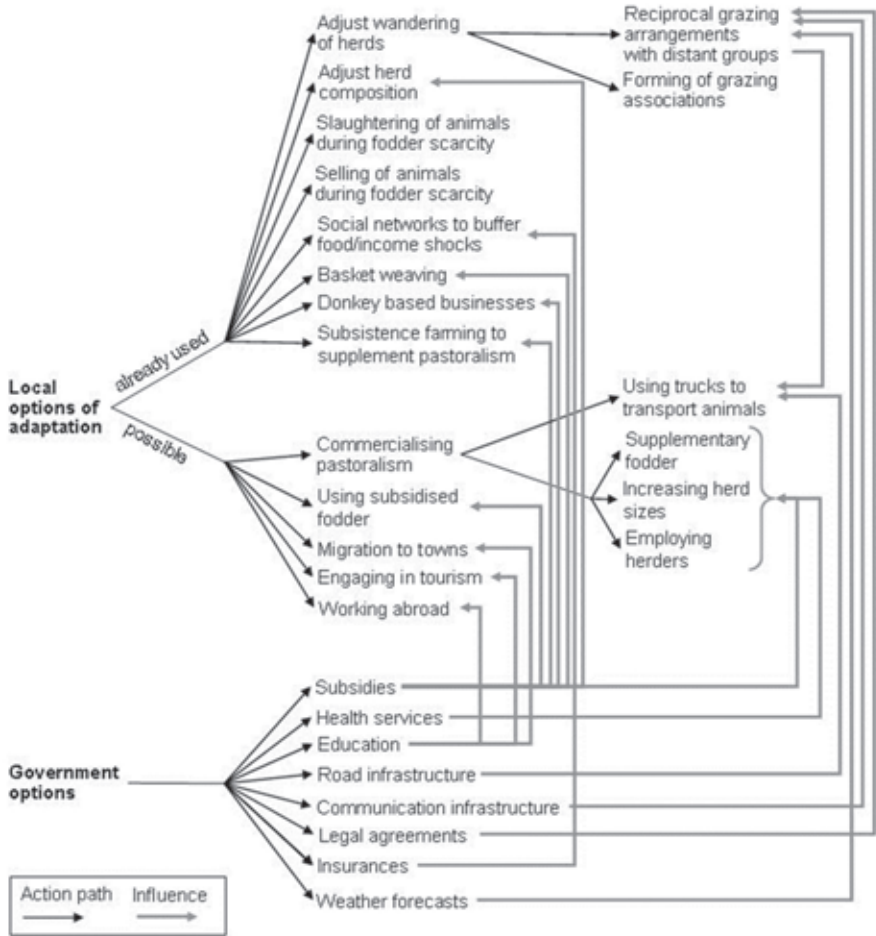
To a limited extent, subsistence farming and fishing around Lake Turkana is used to supplement pastoralism (see Figure 3 and Yongo et al. 2011). In general, the diversification of food sources strengthens food security and hence reduces the pressure to engage in conflict over scarce resources. However, in practice the climatic conditions in Turkana strongly limit the potential of agricultural efforts. Again, the government could provide subsidies – for example, for catchment tanks to collect the additional run-off from the aforementioned increases in high rainfall events. Instead the government has pursued policies which were aimed at transforming pastoralists into pure sedentarised crop farmers (see Homewood 2006). The government itself recognises that ‘because such policies were mainly top-down, discriminative and unconsultative, they often failed’ (GoK 2007: ii).

In addition to the adaptation options which are already used, further options are possible (centre of Figure 6). Given access to subsidies and significant investments in the road infrastructure, a commercialised form of pastoralism is feasible. On the one hand, this could increase income security and hence resilience of pastoralists (Watson & Van Binsbergen 2008; Zaal 2011). On the other hand, the enhanced access to markets may intensify the development of commercialised raiding (Eaton 2010). In addition, increased herd sizes which are a necessary element of commercialised pastoralism bear the risk of overgrazing and resource depletion (Wasonga et al. 2011). Instead of subsidising fodder for the commercialisation of pastoralism, the government could subsidise fodder only during periods of drought. This is likely to be more effective in mitigating livestock losses than the current buy-off campaigns.

Migration to urban agglomerations is impracticable simply because there are very few in Turkana with Lodwar (48 300 inhabitants), Kakuma (36 900) and Lokichogio (17 700) being the only towns of significant size (CRA 2011; see also Figure 3). In Lodwar, the largest employer is the relief sector consisting of predominately international NGOs/aid organisations (Owiti 2007).¹⁵ Likewise, engaging in tourism can cur-

15 Examples of NGOs include USAID, Merlin, International Rescue Committee UK and Practical Action.

Figure 6: Local options of adaptation and government options in Turkana



(Source: Own representation based on conducted interviews and Eriksen & Lind 2009 and Omolo 2010)

rently be considered unfeasible as very few tourists find their way to Turkana mainly because of the unreliable security situation, the lack of sufficient roads and the under-developed tourism infrastructure (hotels, services and attractions) (GoK 2007). Other possible options such as working abroad would require the government to improve the region's access to education. Remittances sent by youth with a regular income could in the long run strengthen the adaptive capacity of the receiving pastoral community. In the short-run, however, children and youth attending schools are missing as labour force to look after the herds and provide security for the community.

In summary, the government has several instruments to support a variety of adaptation options in order to prevent pastoral conflicts. Yet, each instrument needs to be used carefully to avoid unintended negative outcomes, such as weakening of the livelihood bases in the case of large livestock buy-offs during drought periods. Ensuring free and safe movement shows the most promise as it strengthens the core adaptive capacity of pastoralists. But improving the adaptive capacity alone is unlikely to end the raiding, especially when it is not done to decrease vulnerability but for commercial purposes.

In these cases, the ‘spiral of violence’ (Scheffran et al. 2014) can be interrupted by inter-communal conflict prevention and resolution mechanisms. Peace meetings and agreements are key as they are able to stabilise relationships between groups, as the peace agreement between the Turkana and the Matheniko has shown for almost 40 years. As part of the European Instrument for Democracy and Human Rights (EIDHR), several peace meetings were held between conflicting parties in northern Kenya as the lead author of this Chapter has witnessed. In addition, peace committees in Pokot and Turkana communities were established and equipped with mobile phones to warn other communities about planned raids and to assist with the recovery of stolen livestock. This is important to avoid counter and revenge raids. Obstacles to a timely distribution of information, however, include the lack of sufficient vehicles as well as road and communication infrastructure (Muhereza 2011). This shows how development deficits not only limit adaptive capacity but also conflict resolution (see also Huchon 2005).

Apart from these deficits, Schilling et al. (2012b) stress the importance of involving not only the elders and chiefs in the peace meeting but also the youth as the central conflict actor. In general, a strengthening of traditional institutions (for example, the council of elders) is expected to have positive effects on inter-communal relations (Adano et al. 2012).

Conclusion and policy recommendations

The first aim of this Chapter was to analyse potential linkages between climatic conditions (temperature and precipitation) and livestock raiding in Turkana. Based on climate and raiding data analysis, qualitative interviews and literature review, the RAST hypothesis was developed. The RAST hypothesis suggests that in regular years with sufficient rain, raiding is mostly conducted before and during the rainy seasons because animals are healthier, they can travel longer distances and raiders find cover for their attacks. But when rains partly or completely fail and a certain threshold of resource scarcity is reached, raids are conducted despite less fortunate raiding conditions. The raids during dry periods do not primarily serve the purpose of restocking but rather aim at gaining or securing control over scarce pasture and water resources. Where the threshold between resource abundance (raiding to restock) and resource scarcity (raiding to control resource) lies, is subject to further research.

Regardless of the exact transformation from one type of raiding to another, it is important to reduce the exposure and sensitivity to climatic changes while strengthening the adaptive capacity of pastoral groups. The climate change exposure, mainly related to increasing temperatures and stronger intra- and inter-annual rainfall variability, can hardly be influenced. Similarly, the sensitivity of pasture and water resources to climatic changes is mostly beyond the human scope. Hence, the most influential element of vulnerability is the adaptive capacity.

The second aim of the Chapter was therefore to discuss options for adaptation and their implications. Several already used and possible options exist which can be supported by a variety of governmental instruments. Mobility is the core element of pastoralism. It is therefore most promising to ensure that the pastoralists can move freely and safely not only within Kenya but also across international borders. Legal agreements between the northern neighbour states (Uganda, South Sudan and Ethiopia) are needed to prevent harassment of pastoralists by security forces along the borders. It is therefore important to implement the Security in Mobility (SIM) initiative which promotes cooperation between the involved governments to harmonise laws and land tenure systems (OCHA 2010a; OCHA 2010c). Improved security of pastoralists crossing international borders would also contribute to reciprocal grazing arrangements with pastoral groups from neighbour states.

Cooperative resource sharing would benefit from an enhanced communication infrastructure. One approach could be through subsidies which can be used to support multiple ways of adaptation to climate change. For example, the government could provide a carefully calculated amount of subsidised fodder to ensure that a higher percentage of livestock survives droughts instead of buying-off animals. Further, subsidising catchment tanks would improve the utilisation of water from the projected increase in annual rainfall. The water would enable pastoralists to start small-scale farming which improves food security especially during periods of water and pasture scarcity.

However, improving the adaptive capacity alone is not enough because it does not address commercial raids. To stop these raids it is important to strengthen inter-communal conflict prevention and resolution mechanisms through the support of traditional institutions and peace meetings. The government and NGOs can facilitate these meetings through the provision of a safe location, transport and food. Failure to mitigate the conflicts increases the vulnerability of the affected communities to climatic changes which in turn could lead to more raiding.

Acknowledgments

We thank TUPADO for letting us use the raiding register. Special thanks go to Raphael Locham from Reconcile/Practical Action for his assistance during the field research and to Andreas Hänslér from the Climate Service Centre in Hamburg. This work is supported through the Cluster of Excellence 'Integrated Climate System Analysis and

Prediction – CliSAP' (EXC177), University of Hamburg, funded by the German Science Foundation (DFG). The German Academic Exchange Service (DAAD) partially funded the field research.

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IV.

**Policies and tools for conflict-sensitive
climate change adaptation**

Towards conflict sensitive adaptation in the water sector: Building the bridge between analysis and action

Dennis Tänzler and Lukas Ruettinger

Abstract

Water, a critical resource for livelihoods and indispensable for human health and sanitation, is already scarce in many regions across the globe. Water availability will be further affected by climate change and disagreements over water allocation priorities can easily exacerbate existing tensions and vulnerabilities in Africa and beyond. To prevent further destabilisation of already vulnerable contexts as a result of climate change, possibly leading to the outbreak of violent conflict, it will be necessary to introduce conflict-sensitive adaptation processes. But how can such processes be designed? To answer this question, this Chapter builds a bridge between theory and practice by discussing how an analytical tool – the Water, Climate Change, and Crisis Assessment Framework (WACCAF) – can be of help for the future conceptualisation of conflict-sensitive adaptation regimes. Informed by the existing literature on water as a source of conflict and cooperation, we first examine the interrelationship between adaptation and conflict in the international climate policy debate. Since the role of conflict is only reflected to a limited extent when adaptation processes are designed and implemented, we argue that assessment tools such as WACCAF are needed to inform adaptation processes. This can be an important step towards a conflict-sensitive design of respective water-related interventions.

Keywords: water, climate change, crisis, conflict, assessment

Introduction: Climate change, water and conflict

The future of water resources is called into question due to global environmental changes such as climate change, population dynamics and economic growth. Water availability around the world and especially in different parts of Africa is uncertain due to increasing temperatures and diminishing precipitation (Bates et al. 2008). Water quality is declining from mass pollution (UN World Water Development Report 2009). As a result, competition over water increases as demand rises for growing domestic, industrial, and agricultural needs. Countries with low adaptation capacities are likely to be most affected by climate change (IPCC 2007). Where governance structures are insufficient to deal with this increasing competition, divergent interests may cause disputes with the potential for violent conflict. In particular, conflicts may arise as a result of water and food shortages, caused in turn by an increase in extreme weather events and climate change-induced mass migration. Weak and fragile states are considered particularly vulnerable due to existing limitations in coping capacity, likely to be exacerbated by climate change. Further weakening of the public authorities can be expected

to lead to national and regional destabilisation, with societal and political tensions potentially developing into violent conflict (cf. Carius et al. 2008; WBGU 2007).

That said, historically, disagreements between countries over water resources have seldom led to violent conflict or even wars (Wolf et al. 2003). In addition, a conflict does not necessarily need to be violent: water conflicts can manifest themselves in multiple ways, from verbal exchanges and confrontations entailing damages to infrastructure or riots, to violent escalations but also to stable institutional arrangements of cooperation (Houdret 2008; Yasmi et al. 2006). However, peaceful ways of water sharing are at risk, given that climate change may affect environmental conditions to an extent that former knowledge on ways to adapt to climate variability may not provide enough guidance to balance competing interests and peaceful conflict resolution.

Since water conflicts have primarily occurred at the sub-national level (Ohlsson 1999; Wolf 1998), different forms of potential conflicts can best be identified at this level based on existing research focused on water-related conflicts (cf. Ruettinger et al. 2011). Water-related conflicts can help illustrate how climate change may affect already conflict-prone contexts and how adaptation planning should deal with this situation. Illustrative examples of patterns of conflict are identified in the next section.

Conflicts between pastoralists and farmers

Pastoralists and farmers in Africa rely on the same resources for their livelihoods: water and land. Competition between those two groups for these resources has often led to conflict and tensions in the past (Nyong 2010). In addition, sometimes conflicts erupt because pastoralists and their cattle, while trying to access a water source, destroy fields or gardens of farmers. Traditionally, pastoralism takes place in marginal areas which are suboptimal for agriculture (Oxfam 2008). Additional factors which tend to contribute to these conflicts include population dynamics, unclear tenure systems on the governance level and socio-economic and political marginalisation of pastoralists (Shettima & Tar 2008). For example, pastoralists are seldom represented in political institutions and governments who often see their lifestyle as backward (Shettima & Tar 2008). In addition, pastoralists and farmers have very different lifestyles and cultures. Combined with different ethnicities and religions these factors can serve as strong group identities (Shettima & Tar 2008). In many parts of Africa, especially along the cattle corridor of East Africa, pastoralist and farmer conflicts take place in already conflict prone regions (e.g., in Sudan or Uganda) which are awash with small arms and non-state armed groups (Mkutu 2008).

Conflicts between agricultural users

Conflicts over water between different users in the agricultural sector are very common, especially between farmers competing over decreasing irrigation water (Abdoul-Fotouh et al. 2008). In addition, the rise of aquaculture (the farming of aquatic organ-

isms such as fish or aquatic plants) has also led to conflicts over water between farmers and aqua farmers. Conflicts between farmers are often fuelled by rising water demand, weak water institutions, and overuse (Gleick 1993). A common case is the overuse of groundwater resources that cause a drop in water tables, which in turn makes it difficult for farmers to access the water as they do not have the technical and/or financial means to dig deeper wells (Tiwari et al. 2009). This overuse often goes hand in hand with socio-economic inequalities between different groups of farmers and feed into already existing rivalries (Houdret et al. 2010). At the governance level, the higher socio-economic status of certain groups of farmers often translates into more power or the ability to use corruption or other informal ways of influencing water management institutions in their favour (Brown et al. 2007).

Conflicts between agriculture and other economic sectors/ domestic water users

Another type of water-related conflict is created through economic and social development processes. The process of industrialisation and economic development leads to the emergence of new user groups in different economic sectors and industries. It also often entails growing urbanisation and the rise of a new middle class which in turn leads to changing domestic water consumption patterns (Molle & Berkoff 2006). These new water users lead to growing demand which is often not met by sufficient supply. This can create conflicts between traditional economic sectors like agriculture and new user groups. These development processes can also be linked with conflicts over land use. This is often the case in peri-urban areas – areas around expanding mid-sized and big cities (Janakarajan 2009). Traditional farmers have to compete with domestic users and investors, for example, in tourist resorts or factories. Infrastructure development often cannot match rapid development and urbanisation. Water pollution by farmers through pesticide use and/or fertiliser run-off or by untreated waste water from domestic or industrial users can further contribute to these kinds of tensions (Butterworth et al. 2007).

Conflicts between public or private water managers and domestic water users

Water is regarded in most countries as an essential public service. Poor water management, the lack of investments in infrastructure or maintenance, and/or changes in the organisation of water management can cause disruptions in water availability or access which, in turn, can lead to conflicts, especially if inadequate service is combined with rising water prices (Balanyá et al. 2005; Barlow & Clarke 2002). Often poorer parts of the population are more vulnerable to these developments, since they do not have the financial means for adaptation measures (like bottled water or private water tanks) or they simply are not able to pay higher water prices. Well-documented examples include conflicts around the privatisation of water services which often lead to

rising water prices unmatched by better services and/or corruption and declining service quality, like in Ghana, Kenya and Mali (Houdret & Shabafrouz 2006; Amnesty International 2009).

Conflicts between water managers and water users affected by large infrastructure projects

Large-scale infrastructure projects in the water sector like irrigation systems or dams have a great impact on water availability and access. Case studies of different African hydropower dams such as the Ethiopia's Gibe 3 Dam (under construction) show the wide-ranging impact on ecosystems and different agricultural and pastoral user groups (Africa Resources Working Group 2009). Dams may increase access to water for large user groups but at the same time they often decrease water availability or restrict water access for other water users. For example, a dam can be used to provide water to surrounding villages or can be transported to far away cities or new agricultural centres. It can also lead to decreased water downstream, especially in years with less water available. These changes in water availability and accessibility can create new conflicts, for example, between public or private water managers of the infrastructure and water users (Houdret et al. 2010). Often weaker social groups are not heard or involved in the planning and decision-making processes of large infrastructure projects. Thus, they have little possibility to influence the outcomes. On the other hand, large infrastructure projects tend to favour large-scale agriculture, industry, and fast-growing urban centres (Houdret et al. 2010).

Conflicts between regions within the same country

Water bodies can cross administrative borders inside countries. If these countries have a decentralised administrative structure and the sub-national units have the power to influence water access and/or availability across their border, conflicts can emerge between those units. Examples for already existing tensions can be found in India where federal states compete for water resources (Tänzler et al. 2011). Similar disputes may also occur in African countries such as in South Africa (Ashton 2002). Those conflicts are often referred to as inter-state water conflicts and normally include the management groups on the governmental state level and the affected user groups. Through water management and infrastructure projects, like dams or irrigation systems, policies of one state can influence the water availability in another state. Often, regulation or conflict resolution mechanisms exist, like treaties governing the shared resources or federal institutions – for example, constitutional courts or special tribunals (Anand 2004). If conflicts arise, often these institutions have failed or existing regulations (which may also have gaps or grey areas) are not implemented. Sometimes, also the lack of regulation or water management institutions leads to conflict.

Despite these typologies of water-related conflicts, it is important to avoid one-dimensional causal explanations when assessing increased risks of violent conflicts relating to the distribution of natural resources such as water and land. Exacerbation of conflicts as a result of climate change is only one possible scenario and the peaceful avoidance of new conflict situations is another. Indeed, there has been substantial research about how environmental cooperation toward common challenges could support confidence building between former antagonists and support peacebuilding efforts (Conca & Dabelko 2002; Feil et al. 2009). Therefore the uneven (and in some regions potentially dramatic) impacts of climate change may – in such a perspective – catalyse cooperation and transcend enmities, but the outcomes will depend on the design and implementation of adaptation policies. The relationship between adaptation and conflict will be analysed in the next section to illustrate the need to bridge the gap between theory and practice. To this end, the insights gained from the development and testing of an analytical tool – the Water, Climate Change, and Crisis Assessment Framework (WACCAF) – will be discussed regarding their relevance to the conceptualisation of adaptation regimes in the water sector.

Adaptation and conflict

It has been demonstrated that water-related tensions may increase and lead to violent conflicts as a result of climate change. To prevent further destabilisation of social structures, possibly leading to the outbreak of violent conflict, it will be necessary to introduce adaptation processes (Carius et al. 2008).

The IPCC (2007: 869) defines adaptation as an ‘adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities’. Adaptation has also become a focal point of the debate over the security implications of climate change and of increasingly scarce water resources; given that greenhouse gas emissions to date have already triggered irreversible global warming. The UN has called attention to the need for adaptation for global security, especially in a UN Secretary-General report on climate change and global security published in 2009 (UN Secretary-General 2009). However, these summons to action have remained somewhat vague about how adaptation policies might be designed and implemented, thus preventing countries from taking concrete action. One reason for this situation may be that most security-policy discussions and deliberations over adaptation take place in separate political arenas, with minimal exchange between the two fields. Another potential explanation is that different conceptual perspectives on adaptation have made it difficult for policymakers to form a consensus, especially when it comes to addressing adaptation needs in conflict-prone countries (Tänzler et al. 2010).

One of the most commonly held views of adaptation is that it is primarily a technical challenge. Viewed through this lens, adaptation reduces climate change's negative impacts via tactics like sharing technology and building better capacity for natural resource management. However, a purely technical approach to these strategies does not go far enough in light of the potentially conflict-exacerbating impacts of climate change. This is particularly true for weak and fragile states, where strategies must include a much stronger political dimension. In addition, to avoid negative adaptation impacts, it is also necessary to anticipate the potential social and political implications of such measures. Indeed, by applying the 'do no harm principle', it becomes clear that adaptation tactics raise not only technical or financial questions, but political questions as well, especially when such measures are implemented in fragile states (Anderson 1999).

This is also of relevance at local levels, where conflicts may occur as a result of adaptations to decreasing water availability. For example, in Kasese, Uganda, tensions are rising as a result of competing demands for available water and as a result of efforts to provide communities with additional water taps (CECORE et al. 2008). Initially only one tap was installed in the Rukoki area, causing anger among the Mahango people. During the process of setting up a water scheme – also relevant for future climate change adaptation – there is therefore the need to involve district water officials as well as representatives of communities competing for the water, like the Rukoki and Mahango communities, during the processes of planning, designing and implementing the water scheme (CECORE et al. 2008).

Adaptation measures could facilitate cooperation instead of conflict. For example, nations may be able to use non-violent conflict resolution tactics to help implement necessary but unpopular adaptation measures, such as resettling populations and negotiating suitable compensation packages. It is quite possible that as those states increase their ability to adapt to climate change, they also increase their social resilience and thus improve their capacity to achieve peaceful conflict resolution and conflict transformation in other areas of society. Thus, successful climate change adaptation could empower countries to better withstand various social and economic stressors. Furthermore, capacities can be developed to jointly deal with the impacts of climate change such as decreasing water and food security while avoiding the destabilisation of their governing institutions and societal structures.

If adaptation processes are participatory, they can also give marginalised groups a voice to integrate their concerns in building resilient communities. A good example of how water-sharing infrastructures can be established successfully in conflict-sensitive environments is a project supported by Saferworld in Uganda. Saferworld and its local partners introduced not only new gravitational flow schemes in order to share water between different villages and groups hostile to each other but were also concerned with integrating the various groups in a unified committee. In this way, inter-group tensions were reduced and the long-term sustainability of the project was ensured (Harris

2008). Mechanisms for consensus-building and public dialogue as well as coordination among different government branches and affected stakeholder groups are therefore needed. Through the establishment of appropriate policies, tools and guidelines for crisis and conflict management, adaptation processes can improve levels of good governance and establish a common language when designing conflict-sensitive intervention mechanisms. One way to do this is to apply the lessons from existing conflict-sensitive development (cf. Ruckstuhl 2009; Saferworld 2008).

Creating conflict-sensitive adaptation processes which also have a positive, transformative effect is an ambitious task. A first step, as argued by Saferworld (2008), is to follow the main principles for conflict-sensitivity. These include an understanding of the context in which organisations operate as well as the interaction between them, their activities and the context, and designing the (adaptation) activities in a way that they avoid negative impacts and maximise positive ones (Saferworld 2008). This understanding is also needed with respect to the water-related challenges of climate change. In the following section, we propose one option for the design of conflict-sensitive adaptation regimes in the water sector – with a view to reduce, at the very least, the risk of maladaptation.

Analysing water-related crisis and conflict events: The WACCAF

Understanding local water conflicts and strengthening crisis prevention by identifying and addressing the root causes of conflict is of high priority in the face of the potential security implications of climate change and – as outlined above – for the design and implementation of conflict-sensitive adaptation approaches as identified by Yanda and Bronkhorst (2011). However, analytical tools for assessing the relationship between water resources and conflict are still rare, despite the urgent need for such instruments (Gaus & Houdret 2009). Existing water-related tools and training do not take into account the specific challenges related to climate change or pre-existing socio-political conflict. The same is true regarding the role of water in peacebuilding and conflict prevention. On the other hand, many actors in the water sector still stick to classic water supply and management projects without sufficiently considering conflict and cooperation potential (Houdret et al. 2010). In the light of the need for a tool assessing the links among water resources, conflict and climate change, this Chapter assesses WACCAF with a view to gaining insights for conflict-sensitive adaptation regimes.¹

1 See Ruettinger et al. (2011). The development of WACCAF was funded through the European Union's (EU) Peacebuilding Partnership Programme, and builds upon the outcomes of the EU's Initiative for Peacebuilding (IFP). It was field-tested in Uganda and India. See <http://www.initiativeforpeacebuilding.eu>

Purpose of the WACCAF

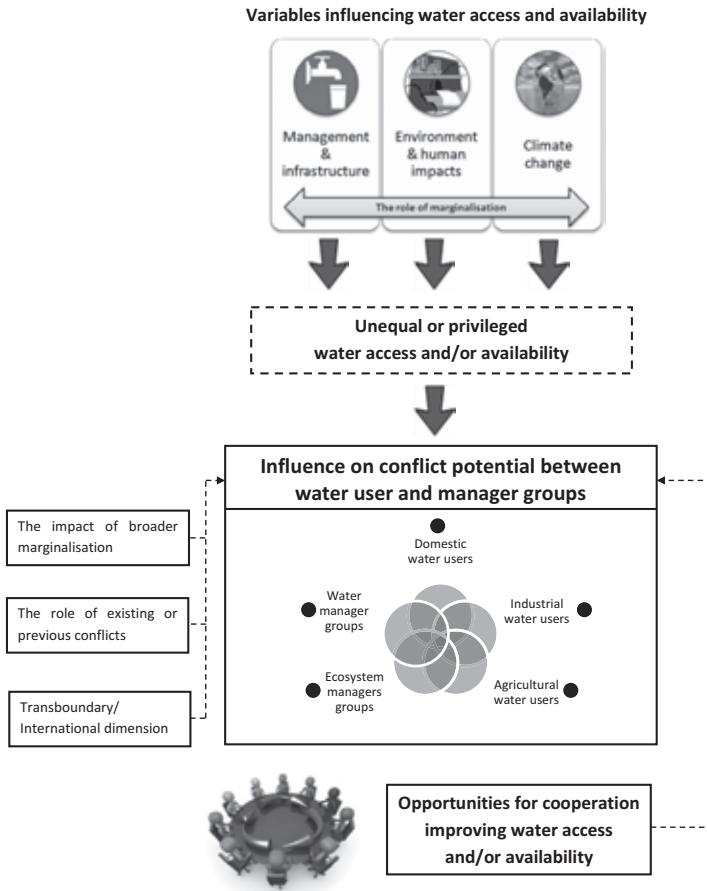
Choosing the word crisis instead of conflict as part of the name of the WACCAF points to the first important understanding the framework is based on – the importance of the context and the situation in creating conflict potential. Sudden change can occur in unstable and complex situations, such as political, social or economic crises. Taking water crisis as a starting point, the tool is centred on conflict potential arising from increased competition over water access and/or availability between user and/or management groups in the water sector. By analysing the root causes and factors of such conflicts such as marginalisation and histories of conflict, the tool maps crises in their broader socio-political context, providing a practical assessment of existing or potential conflict trends. However, the tool does not only focus on conflict but also identifies factors which decrease conflict potential and could be used as entry points for action.

Key features of the WACCAF

As noted, water conflicts can arise between different social groups. From the resource perspective, they can be divided into two main groups: first, water users groups, like agricultural, domestic or industrial users (Gleick et al. 2009). Examples are farmers, fishermen, paper mills and hydroelectric power plants but also individual households. Second are natural resource management groups or simply management groups which control the availability of and/or access to water resources. Management groups can either manage the resource itself, like informal local irrigation communities or public and private water service providers; or they can manage ecosystems that are important for water access and availability and thus govern water indirectly, like government authorities managing wetlands.

Water access refers to the users' need to access a water resource at certain points, like a river bank or water tap, in order to be able to use it. Water availability on the other hand refers to the water that can actually be used. It does not only mean that there is enough water (quantity) but also that it is not polluted (quality). The basic assumption of the WACCAF is that competition between different users and/or management groups over water access and availability can turn into conflict, especially if demand increases or the resource becomes scarcer. However, there is no simple causal chain of events. There are rather a number of key conflict factors that play an important role in escalating competition into conflict. As part of the WACCAF these conflict factors are analysed in detail and can, hence, serve as a blueprint for a peace and conflict assessment to be conducted by policymakers, practitioners or researchers (Ruettinger et al. 2011). Figure 1 below provides an overview of how the assessment framework is conceptualised and how the different parts, discussed in the following sub-sections, are related to each other.

Figure 1: The water, crisis and climate change assessment framework (WACCAF)



Part 1: Analysis of water access and availability

The first part of the analysis concentrates on water access and availability, more specifically on unequal water access and/or availability. Research on local water conflicts suggests that if unequal water access and/or availability affect marginalised groups, it can exacerbate already existing tensions and make communities more prone to conflict (Gehrig & Rogers 2009; Houdret 2008, Houdret et al. 2010; Lecoutere et al. 2010; Richards 2002).

Marginalisation is the exclusion of a group from economic, social and political means of promoting one’s self-determination (Burton & Kagan 2005) and it often goes

hand in hand with unequal water access or availability. For example, the socio-economic marginalisation of certain groups is often connected to a lower socio-economic status. This lower socio-economic status can lead to unequal water access and/or availability, for instance the urban poor who cannot afford clean water or poor farmers who do not have the financial and technical means to dig wells. Socio-economic marginalisation in turn is often connected to political marginalisation, as marginalised groups are often excluded from decision-making processes and do not have the same voting rights or means to express their interests in the political system. Normally, marginalisation of a certain group is not restricted to the water sector. In fact, if a group is experiencing unequal water access or availability it is more likely that this group is marginalised in general (UNDP 2006). This also means that inequality in the water sector is much more likely to be perceived as unjust, since it feeds into already existing grievances, thus raising tensions. However, inequality, grievances and marginalisation do not lead only to increased tensions; they often also bring about stronger group identities both in the marginalised as well as in the more powerful group. These group identities are a powerful mobilisation resource and strategy, which can later be used to escalate a conflict, especially when it turns violent (UNDP 2004).

Based on this insight, the WACCAF helps to assess how marginalisation and unequal water access and availability interact. Water access and availability are dependent on a number of variables. The WACCAF structures them in three sets of factors:

- the role of water management and infrastructure;
- the environment and human impact; and
- the role of climate change.

To assess the potential for a local water conflict, these three sets of factors are the starting point. The goal is to understand the specific links between marginalisation and unequal water access and/or availability in each of the three sets of factors. This does not mean that interactions between the different categories should be disregarded; it just serves as a structure that helps to break down the analysis into smaller tasks which also will be useful when considering adaptation options in water-related areas.

The role of water management and infrastructure

The first and most obvious entry point for understanding unequal water access and availability is the resource itself. When trying to understand water management, it is important to analyse the institutions that set rules, allocate water, collect tariffs and set up infrastructure. A clear sign of trouble is when these water management institutions mirror the socio-economic or political marginalisation of certain groups. Common examples are preferred water access for large-scale agriculture, industries or urban development leading to negative impacts on the water access and availability of small-scale farmers or poorer population groups. In order to establish good governance and conflict-sensitive water distribution practices and institutions it is necessary

to integrate the needs of various groups into the existing and envisioned projects – with respect to ethnic, religious or economic differences as well as gender discrimination which makes women especially vulnerable for the impacts of water management changes (Beltrán 2003).

Corruption can aggravate marginalisation by giving more powerful groups and resource-rich the possibility to influence water management institutions. They can ignore rules and regulations allowing them to deplete and pollute water stocks, exploit and destroy valuable ecosystems and steal money that was meant to build and maintain public water infrastructure (Transparency International 2008). However, poor governance that leads to unequal water access and availability can also be due to insufficient financial, technical and managerial capacities. For example, agricultural water supply is often not taken into account in urban planning or infrastructure is set up in ways that later lead to conflicts (Harris 2008). Also, the lack of water management institutions can easily lead to problems, through overuse of the resource.

An especially conflict-prone situation is when water management changes: a well-publicised example of this is the privatisation of the water supply in the Bolivian city of Cochabamba (Beltrán 2003). Discontent over rising prices, especially among the urban poor, met unresolved grievances built by years of marginalisation and conflict. This led to protests and violent clashes between protesters, law enforcement and the military, leaving more than a hundred people injured and one person dead (Beltrán 2003).

Environment and human impact

Another way of looking at water access and availability is by analysing the impacts humans have on the environment. This can happen directly through pollution and overuse, but also indirectly via the destruction of ecosystems that provide important functions in the water cycle – such as forests or wetlands, which serve as water storage and filters (Millennium Ecosystem Assessment 2005). Problems arise when one group impacts or controls an ecosystem or water resource in a way that restricts the water access and availability of another group (Gehrig & Rogers 2009; Houdret et al. 2010; Richards 2002). In this regard, the control over land and land ownership are especially important, because they often give one group the possibility to impact or control a water resource or ecosystem. Examples of impacts include individual land owners who decide to cut down a forest or a government restricting access to wetlands by declaring them a nature reserve.

Governance institutions and policies influence these dynamics. Again, formal and informal governance institutions, and their policies, can mirror the marginalisation of certain groups. This can be very obvious, as in the case of land tenure systems that disadvantage certain groups (Amman & Duraiappah 2004). It can also be more indirect, such as subsidies for only certain farmers, which allow them to dig deeper wells; this in turn lowers the water table leading to less water for poor subsistence farmers who do not have the capital, nor received the subsidies, to dig deeper wells (Houdret

2008; Houdret et al. 2010). Governance problems like corruption, lacking capacities and failures in implementing environmental legislation often create or aggravate pollution, overuse and ecosystem degradation (UNDP 2006).

The role of climate change

The last factor that is important to understand in regard to water access and availability is climate change. From a security perspective, climate change is often understood as a threat multiplier. This means that climate change increases the conflict potential by putting additional stress on a crisis situation (Carius et al. 2008; UN Secretary-General 2009). With regard to water, global warming is predicted to accelerate the process by which water is transferred within our climate system. This will most likely cause substantial changes in precipitation patterns and intensity, impacting water users that depend on rain as a water source, for instance farmers using rain-fed agriculture (Houdret et al. 2010). Also, extreme weather events like droughts, floods and storms will increase. At the same time, rising temperatures will accelerate the melting of ice and snow cover impacting the timing and discharge rate of river flows (Bates et al. 2008; Gleick et al. 2009; Kabat & Bates 2003; Ludwig et al. 2009). These effects can interact, as in the case of India where climate change is altering groundwater recharge rates by accelerating the melting of Himalayan glaciers combined with erratic precipitation falls (Prakash & Sama 2006; Zemp et al. 2008).

Another major impact of climate change is the expected rise of sea levels caused by the melting of glaciers, ice caps and ice sheets coupled with the thermal expansion of the sea due to higher water temperatures. This will lead to floods along coastal areas as well as salt water intrusions into coastal aquifers, thus affecting water quality (Trumper et al. 2009).

The consequences of climate change are often exacerbated by other human impacts or environmental factors. In many places people settle too close to coastal areas or flood plains, thus increasing their vulnerability to the effects of climate change (Ludwig et al. 2009). Additionally, ecosystems that provide protection from extreme weather events – such as mangroves and coral reefs that provide protection against floods – as well as ecosystems that regulate the local climate, like forests, may be destroyed (Trumper et al. 2009). These dynamics can be connected to socio-economic marginalisation, since poor population groups often have no alternative to settling in marginal areas or to using ecosystems in an unsustainable way, in order to provide for their livelihoods. Also, poor population groups might not have the financial and technical capacities to develop resilience or adapt to climate change (Raleigh 2010). For example, subsistence farmers normally depend on agriculture as their sole source of income. If this income source breaks away because of changes in water availability, they will likely not be able to adapt, due to insufficient education or financial capital (Raleigh 2010). Lacking access to financial and technical capacities for climate change adaptation can also be a sign for political marginalisation. While adaptation mea-

asures can help to reduce the vulnerability of poor and marginalised communities (UN-FCCC 2007), they may – in the worst case – also lead to new conflicts, for example, if new dams are built to improve water supply or if demand management puts restrictions on certain water users (World Commission on Dams 2000). This is the reason for drawing attention to a broader context when assessing the likelihood of water-related crises and conflicts.

Part 2: Analysis of the broader context

The second part of the analysis is to consider important conflict factors beyond water availability and access in the social and historical context. As mentioned earlier, marginalisation is rarely limited to water availability and access. It is often connected to broader marginalisation. Also, past injustices might have already led to conflicts around other issues.

In general, the potential for water conflict is much higher if there is already a history of conflict or if there are ongoing conflicts. Often, there are ‘hidden conflicts’ underlying the water conflict (Means & Josayma 2002). Examples are civil wars, independence movements or conflicts and tensions along ethnic lines. These past or ongoing conflicts have most likely led to polarisation and strong group identities, especially if violence was involved (Enns 2007). Often political leaders play a decisive role in these conflicts. They can help create or aggravate cleavages between groups by using them to mobilise their constituency. Therefore, it is important to understand how broader marginalisation and past conflicts play into the emergence of disputes over water.

Besides conflicts between user groups, conflicts in the region or neighbourhood can also increase the potential for conflict. For example, neighbouring conflicts can create refugee flows, leading to increased competition over resources in the receiving country. Not only refugees cross borders, however, and often small arms become more easily available, providing the means to turn a conflict violent; even the conflict itself might ‘spill over’ the border (Geiss 2009), for example, if rebels use neighbouring countries as a base or retreat area (Fearnely & Chiwandamira 2006; Smith 2004).

The analysis of the broader context thus links the local water conflict to larger conflict structures and factors beyond the water sector. Without such an analysis, any assessment of a water conflict will be incomplete.

Part 3: Identification of conflict prevention and cooperation potential

The third part of the analysis changes the perspective. It is not enough to simply look at the factors that contribute to an increase of conflict potential to ensure that future adaptation measures can serve as a means of conflict prevention. It is just as important to understand the factors that decrease the conflict potential or manage conflicts in a non-violent manner. Conflicts are a normal part of society. They can be a powerful and important catalytic force of change and of righting wrongs. Conflict resolution

mechanisms, if they are legitimate, inclusive, representative, and transparent can help to manage a conflict in a non-violent manner. However, if perceived as partisan, illegitimate, corrupt or unrepresentative, they are likely to create new grievances (Bächler et al 2002).

Besides conflict resolution mechanisms, another important mechanism to prevent conflict is cooperation between (potential) conflict parties. This includes business and trade but also cultural associations and joint resource management institutions. Over the long term cooperation opens communication channels, builds trust and creates relationships. These channels and relationships can later be used to manage disagreements (FOEME 2005; Mathieu et al. 2001). This also works the other way around: cooperation in the field of environment and water can reduce the potential for other conflicts and thus be a tool for peacebuilding and conflict prevention beyond the water sector. Oxfam used this approach to promote peace among conflicting tribes in the highlands of Papua New Guinea. Working with women who have taken the initiative to take action in ending the conflict, Oxfam is successfully bringing former enemies together to work on the construction and management of a new water supply system, building trust and opening communication channels among the groups in the process (Oxfam NZ 2010).

A crucial question in this regard is how to get conflicting parties to come together and start cooperating if they do not want to. This will also be of utmost importance when different societal groups become involved in the design and implementation of adaptation measures. Cooperation only works if all parties have an interest in cooperating. Thus, a thorough understanding of the different interests and positions can provide a starting point. This understanding can be used to create an interest in cooperating, either by providing benefits and incentives to cooperate or by punishing non-cooperation (Means & Josayma 2002; Engel & Korf 2005). It is very important that any attempt to prevent or manage a conflict is done in a way that does not create any unintended and aggravating consequences. In the world of development cooperation this concept is called 'do no harm' (Anderson 1999; OECD 2001) and contributes to the conflict-sensitive design of policy interventions.

Conclusion: WACCAF as one supporting tool on the way to conflict-sensitive adaptation regimes

There are many indications that the challenges for African states which are already weak will grow as a result of climate change (Carius 2009; Spooner 2010; Brown & Crawford 2009). This is especially true for future water availability and access to water. To prevent violent conflicts over water, the introduction of adaptation processes can be one crucial step. However, a purely technical approach to these strategies may not go far enough in light of the potentially conflict-exacerbating impact of climate change.

Our analysis of the manifold types of water-related conflicts illustrates that a more systematic reflection on peace and conflict dynamics is needed to create conflict-sensitive adaptation processes right from the beginning. This is even more relevant in the light of potential risks of maladaptation, that is, that the redistribution of water resources as a climate policy response intensifies already existing tensions and conflicts.

To address this policy challenge we suggest applying an analytical framework tool, namely WACCAF, which can help identify the sectors critically affected by climate change and inform adaptation policy processes regarding the need to consider the potential conflict relevance of the measures to be adopted. WACCAF can be used to draw the attention of different water users and decision-makers to the importance of conflict-sensitivity in their respective fields. Careful attention needs to be paid when communicating and distributing the outcomes of the assessment in a region potentially affected by conflicts such as the Great Lakes Region or parts of Eastern Africa. As the WACCAF framework analyses contentious issues covering a wide range of sensitive topics, such as the role of marginalisation in conflict, the findings could highlight one group's disadvantage compared to another. It is important that these do not serve to legitimise one group's behaviours or actions that create further divides and fuel conflict. The cooperation potential identified in the assessment can play a crucial role in resolving and preventing conflict and to inform adaptation processes.

In the best scenario, such an assessment raises awareness, identifies key risks and conflict potentials, enables the next steps of action, identifies knowledge gaps, can be used to conduct case studies and can also be used directly for capacity building at the local level. Training can be organised and offered to relevant actors working in the field that may include, for example, civil society organisations supporting peace efforts. Training ideally involves a combination of workshop sessions and a field trip visit to a conflict area with the trainees. Training may also be provided to any institution or individual working in the water sector wishing to improve their knowledge on water-related conflicts and their response strategies, for example, in the field of adaptation.

Tools such as WACCAF will enable the situation with regard to possible conflict to be understood at the outset, and to ensure coherency and coordination with other planning processes. Such – potentially mandatory – peace and conflict assessments can be used to reduce the danger of maladaptation. A training and capacity tool can further help to enable stakeholders from governments and NGOs to work together to jointly identify risks and formulate strategies and programmes to help raise awareness among civil society of the impacts of climate change. In this way, it is possible to win acceptance for the transformation processes necessary to secure *inter alia* the supply of water and food. However, the funds provided by the international community to date to support adaptation processes allow only a limited number of countries to identify adaptation priorities using a stakeholder-based approach.

Methods and instruments such as WACCAF can assist civil society and decision-makers, especially in fragile states, to develop and implement conflict-sensitive adap-

tation strategies. Participatory processes for the mutual identification of the impacts of climate change specific to the region are only the beginning. For example, divergent interests must be contained in discussions on water or land distribution. To ensure that social and economic injustices are not exacerbated by climate change, the international community must make a substantial commitment – and not only a financial one. Indeed, vigorous dialogue needs to be established across the climate change, development and peacebuilding communities to harness the co-benefits adaptation may have for peace and security across the world.

In the course of the future evolution of the adaptation policy field, such approaches as a central element of capacity building can be supported. However, adaptation measures should also be better integrated into development processes and the fight against poverty, and institutional support for adaptation programmes should be expanded. Failure to apply a systemic approach to the creation of national adaptation programmes and plans will make conflict-sensitive implementation difficult. Hence, further institutional support is imperative also to ensure that conflict-sensitive adaptation processes will be designed and implemented.

Such activities need not only be directed to the local or national level in Africa and beyond but are relevant for transboundary settings as well. It will further be necessary to strengthen water-related regional cooperation arrangements to meet the challenges of adaptation created by global climate change. The extension of existing river area agreements to cover the expected impact of climate change will also need a systematic assessment of the overall impacts of climate change on water user groups and peace and conflict dynamics. Cooperation between countries with bordering watersheds has long been a focus of the international donor community. One prominent example in this regard is the Nile Basin Initiative but there are also other examples like the Zambezi and the Okavango (GTZ 2007). As a result, it is often possible to make use of existing structures.

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Humans as sensors: Fusion of participatory mechanisms and computational innovations to monitor climate change and its consequences

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Abstract

The widespread use of mobile phones and social media generates new possibilities for data gathering and analysis. This Chapter explores the applicability of ‘crowd-sourced’ electronic data gathering to detect the environmental and social consequences of climate change on the African continent. This is especially critical in light of the potential impacts of climate change on conflict in Africa, and the need for adaptation that is conflict-sensitive. Applications could range from social-network-based initiatives in which volunteers document environmental conditions and changes in their communities, to the aggregation of cell phone usage data from millions of accounts to determine trends in population movement that could signal resource stress and presage conflict. Such data gathering techniques may be particularly well-suited for application in Africa, where mobile phone usage is increasing at a faster rate than in any other region of the world. On the other hand, the African telecommunications environment poses unique challenges. The Chapter offers some initial suggestions about how crowd-sourcing techniques could most effectively be applied to explore the climate-conflict nexus in Africa.

Keywords: crowd-sourcing, crowd-sourced, social network, climate change, conflict

Introduction

The increasingly widespread use of electronic communications creates new opportunities for data gathering and analysis. It is now possible to easily aggregate and analyse millions of data points from publicly available social media and cell phone records, for example, each data point representing the contribution of an individual person – the human as a sensor. In addition to commercial applications such as market research, these data aggregation and analytical techniques can be used for social good. This Chapter explores possible uses of ‘crowd-sourcing’ techniques – aggregation of data from large numbers of technology users – to assess climate and conflict concerns in Africa.

As other contributors to this book have indicated, we do not yet have a full understanding of the ways in which climate change may cause or contribute to conflicts. What information is available today is consistent with policymakers’ labeling of climate change, in general terms, as a ‘threat multiplier’ (UN General Assembly 2009; UN Security Council 2011). We hope that the types of data-gathering techniques dis-

cussed in this Chapter will help produce a better understanding of linkages and variables to inform policies and interventions. Our approach in this Chapter is a broad one: we consider all dimensions of the environmental and social effects of climate change to be of possible interest, since even variables that might seem very remote from questions of human conflict could turn out to be relevant in unforeseen ways.

In the second section of this Chapter, we provide a brief overview of uses for which crowd-sourcing has been utilised to date in social good domains. The third section discusses technical opportunities and limitations specific to Africa. The fourth section provides a brief overview of standard tools and techniques for monitoring climate change and its consequences in Africa as well as deficiencies in that monitoring regime. The fifth section offers a preliminary brainstorm of ways crowd-sourcing can be used to monitor climate and conflict issues in Africa. We conclude with specific policy recommendations.

Crowd-sourcing for social good

Crowd-sourcing is a spectrum of practices. At one extreme are techniques that rely on the active contributions of numerous individuals (the ‘participatory mechanisms’ in the subtitle of this paper). A paradigmatic example is Ushahidi, a software platform with African roots. Ushahidi (meaning ‘testimony’ in Swahili) was developed in the aftermath of Kenya’s disputed 2007 presidential election as a platform to aggregate emailed and text-messaged eyewitness reports of violence and geocode them onto a Google map. The platform is freely available and has been adapted for many purposes, including monitoring political violence in Gaza, aiding in search and rescue following the 2010 earthquake in Haiti, tracking the availability of medicines at pharmacies in Kenya and Uganda, and monitoring elections in Mexico and India (Essoungou 2010a).

At the other end of the spectrum are techniques that rely on the researcher to tease out meaning from large data sets (the ‘computational innovations’ in the subtitle). For instance, Sakaki et al. (2010) show that real-time detection and tracking of events such as earthquakes could be accomplished by monitoring Twitter traffic. By classifying tweets based upon keywords, number of words, and context and by applying semantic analysis, they automated the identification of linked tweets referring to the event of interest.¹ Next, they applied filtering techniques to estimate the time and location of relevant tweets. Finally, they produced a probabilistic spatiotemporal model for the target event, indicating its likely centre and trajectory.

1 Semantic analysis algorithms compensate for spelling errors, take account of synonyms and homonyms, etc. Pioneering work was performed at the University of Memphis (Louwerse et al. 2006; Hu et al. 2003).

Thanks to the pioneering work exemplified by Ushahidi and Twitter analyses, we are in the midst of a new computing revolution, one that uses participatory mechanisms and computational innovations to draw on the ‘wisdom of crowds’. Quasi-real-time, locally-derived in situ observations can now be gathered to form pictures as comprehensive and as wide in geographic scope as previously could only be achieved using remote sensing. Analytical challenges in studying ‘humans as sensors’ include the wide variety of sensor types and locations and ambient noise characteristics. Many researchers have contributed to overcoming these challenges, honing applications of social media to detect earthquakes, monitor traffic and detect accidents, map pollution, monitor public health, and more (Consolvo et al. 2008; Faulkner et al. 2011; Hoh et al. 2008; Mohan et al. 2008; Krause et al. 2008; Mun et al. 2009; Völgyesi et al. 2008). The following paragraphs describe several ways in which this new computing revolution has manifested itself.

One innovation, proposed by Faulkner et al. (2011) and implemented by several research groups, is to take advantage of the built-in accelerometers (motion sensors meant to detect whether a device has been dropped) in newer laptops and smartphones. By means of ‘anomaly detection’ (detection of unusual patterns of acceleration) and aggregation of results from many devices, this approach is able to detect macro events like earthquakes.

In the wake of the 2011 Tōhoku earthquake and tsunami, accidents at Japanese nuclear power plants spurred widespread fear of radiation poisoning. A grassroots effort emerged to aggregate publicly available data (from sources as diverse as government monitoring stations and Geiger counters duct-taped to the balconies of Tokyo apartments) to create interactive maps and graphs of radiation levels in Japan, East Asia, and the US (Saenz 2011; Shenkman 2011). One important implicit value of the grassroots effort was as a check on the veracity of government pronouncements about public safety. It is easy to imagine that this sort of check would be valuable in the case of many types of crises and near-crises, including those that could be climate-related – for example, independent monitoring of river levels in a storm.

An extension of semantic analysis is sentiment analysis, an approach that uses natural language processing, computational linguistics, and text analytics to take the pulse of a target demographic and translate expressed emotional cues into machine-parsable data. As was demonstrated in the August 2011 riots within several cities in the United Kingdom, social sentiments can easily escalate and propagate throughout a geographically diverse social network at speeds far exceeding the pace of government response. Close monitoring of social networking sites through sentiment analysis enables a faster response by government (or a third party) including proactive measures to address public concerns and safety.

As this Chapter is being written, crowd-sourcing of both the participatory and the computational kind is playing an increasingly important role in the international monitoring of unrest and repression in Syria, a nation that is closed to outside relief work-

ers and news agencies. Running on an Ushahidi platform, the Syria Tracker crowd-sourcing project aims to document eyewitness reports of human rights violations. The Standby Volunteer Task Force, in association with Amnesty International USA's Science for Human Rights Programme, has begun to use crowd-sourcing imagery analysis to try to identify mass human rights violations (Meier 2011). This effort includes tagging the location of Syrian heavy military equipment on digitised maps using high-resolution satellite imagery (The Standby Task Force 2011).

While 'active' crowd-sourcing technologies empower the individual with a mobile device to inform others during a crisis, it is important to remember that access is unevenly distributed. Furthermore, there is the problem of how to get crowd-sourced information into the hands of the people who need it the most, and the difficulty of ensuring that it is accurate. Ortmann (2011) has observed that social media platforms are frequently overlooked by humanitarian agencies, and that when relief workers do pay attention to social media such as Ushahidi, questions frequently arise as to the authenticity and accuracy of postings.

Researchers who apply sophisticated computational analyses to data sets composed of numerous individual contributions must confront similar issues of representativeness – which layers of society are visible in the data set, and which are not? And even beyond the technical challenges of acquiring, parsing, and analysing the data, researchers must confront ethical issues. Is the proposed use of 'human sensor' data without consent ethically sound? To what range of socially beneficial or detrimental uses might new techniques and findings be put? Such issues must be debated as these technologies and applications develop.

The African context

To what extent can the tools and techniques described above be applied to gather data on climate and conflict (and other topics) in the African context? This section discusses the state of mobile phone technology and social media in Africa.

Mobile phones

Mobile phone use in Africa has increased dramatically in recent years. The head of the International Telecommunication Union (ITU) observed in 2009 that no other region in the world matches Africa's growth rate for mobile technology (Touré 2010). From 2004 to 2009, mobile cellular subscriptions increased by an average of 42% per year (Touré 2010), while the population covered by a mobile cellular signal jumped from 25% in 2000 to 58.5% in 2008 (ITU 2009). By 2010, there were over 400 million mobile phone subscriptions in Africa, more even than in North America (Essoungou 2010b), and journalist Anand Giridharadas (2010) was able to quip that 'more human

beings today have access to a cellphone than the United Nations says have access to a clean toilet’.

It appears that not even political instability, pervasive conflict or absence of effective government (for example, in Somalia) have deterred investors, operators and customers from participating in the mobile telephony market (Best 2011; Schwartz et al. 2004; Sullivan 2006; Winter 2004). Comparative analysis suggests that while mobile phone teledensity (the number of phone subscribers per 100 people) correlates positively with economic, political and social welfare indicators in regions like Africa, it ‘seems immune to security concerns’ (Best 2011: 15). If anything, Best (2011: 25) concludes, ‘people cling to their mobile phones as tools for security and safety’.

For many in Africa, a mobile phone is an essential element of livelihood. It prevents wasted trips, provides information about crop prices, summons medical help, and serves as a reliable conduit to modern banking services (Ewing 2007). Services like PesaPal and M-Pesa in Kenya cut out traditional banks entirely by enabling people to wire money from phone to phone (Giridharadas 2010). Columbia University economist and emerging markets expert Jeffrey Sachs calls the cell phone ‘the single most transformative technology for development’ (Ewing 2007).

The widespread use of mobile phones suggests great potential for crowd-sourcing research. However, the computational analyst who wants to extract demographic or other information from aggregated African mobile phone data faces several challenges.

First, African teledensity (or phone penetration) rates are likely to over-count the number of actual subscribers, due to purchased but inactive accounts, and to significantly undercount the number of actual users, due to mobile phone sharing or rentals. In some areas, such as Liberia, the user-to-subscriber ratio may be as high as five to one (Best et al. 2009: 469). In addition, ‘many Africans carry several mobile phones or sim cards in order to overcome market and regulatory failures, such as inflated charges to call rival networks, the absence of interconnection between operators, and inadequate network coverage’ (Sutherland 2011: 27). Hence, even to get a reliable count of the number of ‘humans as sensors’ is tremendously difficult.²

A second obstacle is the limited extent of geographic metadata. Many regions of the world have well-established postal codes and accompanying spatial data sets. These are

2 In January 2003, South Africa passed the Regulation of Interception of Communications Provision of Communication-Related Information Act (RICA), which requires mobile phone users to register their SIM cards. Enforcement (blocking the use of unregistered phones) was scheduled to begin on 30 June 2011 (BuaNews 2011). This type of personal mobile phone registration database, if it were made available to academic researchers, could alleviate some of the difficulty of studying demographic and geographic patterns in cell phone usage. However, there is little expectation of RICA-like phone registration laws beyond the borders of South Africa.

well-integrated into online tools such as Really Simple Syndication (RSS). For most African countries, however, no such robust set of codes or spatial data sets are readily available (exceptions include South Africa).

Furthermore, the business intuition that the make, model and subscription plan of the mobile phone might provide some insight into the demographics of the African user simply does not seem to hold. Individuals at the subsistence level have proven to be some of the most avid mobile phone users. Cellular airtime is sometimes exchanged as a *de facto* currency among the poor (Ewing 2007).

Internet usage and social media

Internet penetration is lower in Africa than in most other regions of the world. At the end of 2010, it was estimated that only one in ten Africans is connected to the Internet (Essoungou 2010b). However, due to the mobile phone explosion Internet usage in Africa is rising dramatically. In a sense, the African market is by-passing the age of the desktop and laptop computer with the conventional web browser and leapfrogging directly to the forefront of the mobile Internet trend. Triple-digit growth rates in mobile Internet usage have been cited as ‘routine’. Trendsetters like Jon von Tetzchner, co-founder of Opera, the leading Internet browser for mobile phones, and Ushahidi developer Erik Hersman foresee dramatic changes in economic, political and social life on the continent growing out of the mobile Internet boom (Essoungou 2010b).

Patterns of mobile Internet usage differ from those of fixed Internet usage in several ways. One important difference is that mobile Internet users tend to spend disproportionately more time with social media (as opposed to email or Web browsing). This is as true in Africa as elsewhere (Essoungou 2010b). Facebook is the leading social media platform in Africa, with over 17 million African users as of the end of 2010 (Essoungou 2010b; Consenza 2011). Twitter and YouTube also ‘rank among the most visited websites in most African countries’ (Essoungou 2010b: 3). Other social media platforms popular in Africa will be less familiar to North American and European readers. Google has launched Baraza (based on a Swahili word for ‘council’), a user-driven question-and-answer service intended to generate local Internet content for African communities (BizCommunity 2010). MXit is an instant messaging application with an estimated 7 million users in South Africa (Essoungou 2010b). The Naspers Group, which owns MXit, also owns 34% of the Chinese social media company Tencent, whose instant messaging client, QQ, has a global subscriber base of 711.7 million individuals (Tencent 2012) and is gaining ground in Africa. Joint African and Chinese ownership of social media companies may be expected to ease China’s expansion of its social media presence throughout the sub-Saharan region.

Researchers who wish to take advantage of a given social media resource will need to consider the extent to which user contributions and user metadata are publicly accessible, and the extent to which they will be able to define the demographic and geo-

graphic characteristics of a body of users and parse the data along those lines. There may be legal restrictions (for example, privacy laws) that apply in a national context. In areas without a functioning government, like Somalia, a researcher will presumably wish to adhere to international norms.

Infrastructure: satellite and fibre

Expansion of mobile phone and mobile Internet usage into rural regions, in Africa and elsewhere, implies the need for an infrastructure to service the market. In recent years, the telecom sector has come to rely heavily on satellite coverage. Satellites connect individual users to telephony and Internet networks, and they also provide 'backhaul', linking remote base stations with the core backbone of the network.

Compared with other regions of the world, Africa has lagged in ground-based telecommunications infrastructure and has been unusually dependent on satellites. In 2006, it was reported that 'some 29 out of 55 African countries and territories get more than 80% of their total international Internet bandwidth by satellite, and many fixed and mobile operators in the region are also dependent on satellite for their domestic communications as well' (Balancing Act 2006). The satellite-based cellular backhaul in sub-Saharan Africa grew from a mere 15.3 Mbps to over 1 067 Mbps between 2000 and 2005.

Recently, fibre communications have been gaining ground in Africa. As of 2010, fibre cable companies were set to operate in all major African nations, with the possible exception of the DRC. An industry bulletin projected that fibre would account for over 88% of market share in major sub-Saharan markets by 2014. 'Rural and remote areas' will continue to rely on satellites, but 'between 90–95% of all demand comes from urban areas and frequently just within the capital of a country. Almost no capitals will be unconnected by fibre' (Balancing Act 2010). In spite of satellites' declining market share in Africa, 36 new satellites are expected to be launched between 2010 and 2013, adding 26 325 MHz of additional capacity to the continent (Balancing Act 2010). It is anticipated that the oversupply of satellite coverage will result in dramatically lower prices for telecom services (Balancing Act 2010). This, in turn, is likely to fuel continued growth in mobile, Internet, and social media penetration of African markets.

The question of satellite versus fibre has implications for telecommunication security and reliability. Earthquakes, armed conflict, and other human and natural disasters may disrupt terrestrial networks, but they are unlikely to affect satellite services. On the other hand, satellite transmissions, especially those on the high-frequency Ka band favoured for mobile phone coverage,³ are susceptible to weather conditions, notably

3 The Ka band covers the microwave frequencies of 26.5–40 GHz. Since it is a higher-frequency band than others commonly used for satellite communications (e.g., the Ku band, 12–18 GHz and the C Band, 4–8 GHz), the Ka band can carry more data than those others and can achieve higher data rates at a much lower price per bit.

signal absorption by moisture in the air and by wetness on antenna surfaces (Acosta 1997). These limitations of the Ka band⁴ hold a special significance for communications in Africa since 31% of the continent has a tropical climate (Peel 2007), and because anthropogenic climate change could potentially exacerbate what are already unusually high natural and historical rates of climatic variability on the continent (Hulme et al. 2001: 145). Indeed, ‘many African regions are coming to be recognised as having climates that are among the most variable in the world on intra-seasonal and decadal timescales ... particularly with regard to rainfall’ (Elasha et al. 2006: 6). The availability of real-time weather information, as well as accurate predictions of precipitation in the near- and medium-term, can therefore be quite useful for anticipating and mitigating disruptions to communications services, while a dearth of readily available climate data puts rural communications coverage, heavily based upon Ka band technological infrastructure, at risk during peak traffic times, such as during crises.^{5,6}

Monitoring for climate change and its environmental and social impacts today – the baseline

Before suggesting ways by which crowd-sourced geospatial technologies can be applied to climate-related issues, we assess the current state of monitoring for climate change and its effects on the African continent.

- 4 The loss of data from normal atmospheric moisture makes the Ka band poorly suited for classical satellite TV. Internet Protocol (IP) traffic can withstand some degree of routine data packet loss, since a receiving device knows to request the missing data again and again until the entire transmission can be reassembled. The delay of a split second or even longer usually does not pose a problem in the Internet based communication. But IP traffic on the Ka band will degrade under conditions of heavy precipitation (e.g., a rainstorm), especially during peak traffic times. See Miller (2007).
- 5 In addition to deficiencies in the gathering of climate data, discussed below, there are deficiencies in the sharing of climate data. Currently, most African countries charge for their climate data, as do most European countries, to help offset the cost of running their weather services. Columbia University, the Bill and Melinda Gates Foundation, and Google’s philanthropic team are negotiating with African meteorological organisations to make weather data more freely available (Martineau 2011).
- 6 Satellite communications are of course subject to human disruption as well. Even regularly scheduled repositioning of satellites can involve worrisome loss of coverage. For instance, in what might be considered a ‘near miss’, a scheduled outage in Broadband Global Area Network (BGAN) services (which connect remotely located laptop computers to Internet networks via satellite) between 7 January and 6 February 2009 in West Africa coincided with torrential rains in regions of Namibia in Southern Africa that destroyed the livelihoods of at least 350 000 people (IRIN 2010).

Essential climate variables (ECV)

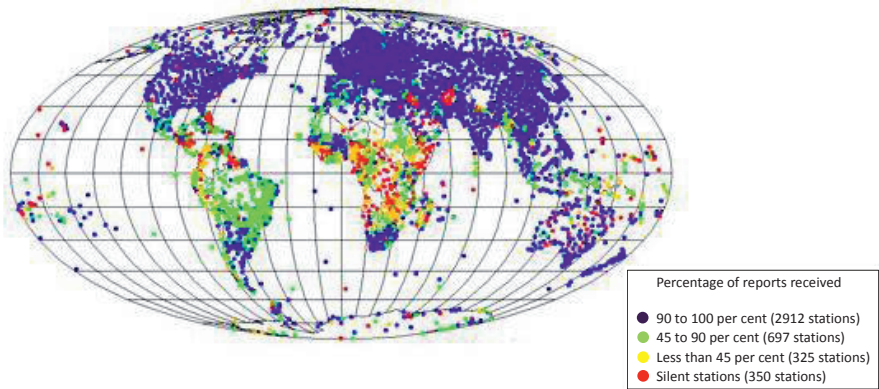
Climate monitoring is undertaken by a variety of actors. Much of the activity is coordinated under the United Nations Framework Convention on Climate Change (UNFCCC), which was established at the 1992 Earth Summit in Rio de Janeiro. The 195 parties to the agreement include every recognised African state. The current *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (WMO 2010: 4) sets out a list of several dozen atmospheric, oceanic, and terrestrial 'Essential Climate Variables' (ECVs). These range from standard meteorological measures like temperature and precipitation to more specialised parameters, such as leaf-area index and albedo.

Many ECVs can be monitored by multiple techniques, and redundant monitoring (use of more than one technique for a single ECV) is encouraged. Remote-sensing methods in particular, including satellite-based methods, must be validated and calibrated by comparison with direct observation. Consultations are being taken to standardise the way nations of the world monitor each ECV, and to establish data quality standards. The list of ECVs is understood to be provisional; it was updated and expanded in 2010 and is expected to continue to evolve 'as requirements change and as technological developments permit' (WMO 2010: 3).

ECV data gathering deficiencies in Africa

National agencies have primary responsibility for implementing the internationally agreed monitoring plans. Developing nations are often at a disadvantage in terms of funding, organisational capacity, and existing infrastructure. As a result, although the Global Climate Observing System (GCOS) has advanced considerably in recent years, 'developing countries have made only limited progress in filling gaps in their in situ observing networks, with some evidence of decline in some regions' (WMO 2010: 2). Deficiencies in the monitoring network are particularly severe in Africa, as the following chart demonstrates.

Map 1: Frequency of Monitoring Reports from Regional Basic Synoptic Network Stations



(Data from 2008. Image from WMO Secretariat/Weather Info for All Initiative, used under Creative Commons Attribution-ShareAlike 3.0 License)

A report on African climate adaptation commissioned by UNFCCC identified Angola, the Congo Basin, Sudan, and parts of the Sahel as areas with the most significant surface monitoring network gaps (Elasha et al. 2006: 8). It also pointed out that high-altitude regions (for example, Mt. Kenya and Mt. Kilimanjaro) are data-deficient (Elasha et al. 2006: 10). The deficiency of climate data in Africa is particularly unfortunate, as Africa is the site of many conflict hot spots that may have been inflamed by climatic factors in the recent past, for example, the recent troubles in Darfur (Webersik 2008), or that could potentially be thus inflamed in the future. In this respect at least, it is a region of the world where the data are most urgently needed.

Attempts to address the monitoring deficiencies have been initiated under the Nairobi Work Programme on Impacts, Vulnerability, Adaptation and the Climate for Development in Africa Programme (ClimDev-Africa). Notably, a public/private partnership known as the ‘Weather Info for All’ initiative has begun installing automated weather stations (AWS) in mobile phone towers in three East African countries, with plans to eventually install 5 000 stations across the continent (Ericsson 2011). Each AWS reports data on atmospheric pressure, temperature, wind, precipitation, and sunlight directly to national meteorological services. The initiative is also working with national meteorological services to facilitate timely distribution of regular forecasts and extreme weather early warnings to citizens via mobile phone (Ericsson 2011).

Beyond ECVs

The *Implementation Plan* recognises that ‘biodiversity and habitat properties are important to climate impact studies but ... they are currently impossible to define as an

ECV as only aspects of these complex properties can be measured, and only at a relatively small number of sites' (WMO 2010: 3). In the absence of ECVs for habitat and biodiversity, the 2010 *Implementation Plan* calls for the establishment of Essential Ecosystem Records: detailed, sustained observation at select sites, especially at sites collocated with official monitoring stations where the full suite of terrestrial ECVs is regularly collected.

The *Implementation Plan* also recognises that data on non-climatic variables, such as those related to pollution, land use, health, agricultural yields, and other socio-economic variables, are also necessary to understand the full picture of climate change impacts (WMO 2010: 43-44). An understanding of non-climatic variables is certainly necessary to develop a more complete understanding of the climate-conflict nexus and to develop conflict-sensitive adaptation strategies.

Attempts to monitor ecological and socio-economic variables are diffuse. Here we describe four representative and fairly large-scale efforts.

Famine Early Warning Systems Network (FEWS NET)

Sponsored by USAID, FEWS NET is a collaborative effort to 'provide timely and rigorous early warning and vulnerability information on emerging and evolving food security issues' in Africa (approximately 22 African nations) and other regions (FEWS NET 2011a). FEWS NET produces and disseminates maps in near real-time showing the extent of rainfall, the extent of vegetation, the progress of storms, etc. Much of this is based upon satellite data.

FEWS NET also works with in-country partners to design and monitor country-specific sets of food security indicators (FEWS NET 2011b). 'On the ground' data-gathering techniques such as household surveys, focus groups, expert observation, and review of health clinic records are used to monitor indicators such as disease rates, water access/availability, and destitution/displacement (IPC Global Partners 2008: 24-28).

FEWS NET is mindful of the value of famine early warning systems with respect to conflict. In 2005, FEWS NET conducted a study and survey in the Karamajong Cluster of Kenya and Uganda to examine links between conflict, climate, poverty and livelihoods (FEWS NET 2005). The survey revealed that inhabitants of the district had traditional-knowledge-based early warning systems for drought and conflict. The report recommended that governmental early warning systems take advantage of the traditional knowledge base.

The Southern African Bird Atlas Project (SABAP)

The Southern African Bird Atlas Project (SABAP) draws on the initiative of a wide pool of lay volunteers to gather scientific information on the distribution of bird species in South Africa, Lesotho and Swaziland. These records are a valuable source of

information for climate researchers. The first SABAP (SABAP1) compiled records of over 7 million bird sightings between 1987 and 1991 (Animal Demography Unit 2010). Since the second round (SABAP2) was initiated in 2007, nearly 1 000 observers have recorded over 3 million bird sightings to date (Animal Demography Unit 2011).

For SABAP2 the study region is divided into ‘pentads’, areas of 5 minutes of longitude by 5 minutes of latitude. Equipped with maps and/or GPS, volunteers spend at least two hours observing birds in a pentad, and record their findings on a paper form. Species are identified and behaviours are noted. Findings are submitted to a central database by mail or by email (in the latter case, in a standardised format using special data management software) (Harebottle et al. 2008). Spin-off initiatives have been set up to monitor frogs, reptiles and butterflies in the region as well.

Climate Change and African Political Stability (CCAPS) dynamic mapping tool

While not a monitoring programme per se, the Climate Change and African Political Stability (CCAPS) programme has assembled a ‘dynamic mapping tool’ that integrates data on climate, conflict, and other topics from diverse sources. Housed at the Robert S. Strauss Centre for International Security and Law at the University of Texas, the CCAPS programme aims to study threats posed by climate change to stability in Africa and to evaluate national and international policy responses to those threats. The CCAPS dynamic mapping tool uses Environmental Sciences Research Institute (ESRI) geospatial technology to display information about climate vulnerability, governance, conflict, and development aid in layered maps. The mapping tool is intended to provide ‘integrated analysis of the drivers and responses related to security risks stemming from climate change’, according to the director of the Strauss Centre (ESRI 2012).

The climate, governance, and conflict data underlying the mapping tool were assembled from a variety of established sources. Data on the distribution of climate hazards came from the United Nations Environmental Programme (UNEP), the United States Geological Survey (USGS), and the Global Precipitation Climatology Centre. Data on the distribution of political stability and violence came from the Polity IV project and the Armed Conflict Location and Events Dataset (ACLED) (CCAPS Programme no date). Data on development aid has been more difficult to gather; CCAPS has had to solicit information directly from multiple aid agencies (Friedman and ClimateWire 2012: 1).

There is great potential to expand and improve the capability of such dynamic databases through integration of new datasets. Possibilities include the georeferenced events database of the Uppsala Conflict Data Programme (UCDP) (which has its own mapping tool), and the Armed Conflicts Database compiled by the Institute for Strategic Studies.

Cyber Shepherd

In 2003, an innovative geospatial social networking effort was launched by the Veterinary Science and Medicine School of Dakar and partners to address problems associated with pastoralism in the Sahel. Over the past century, a combination of policy failures and climate change has led to loss of vegetation cover, degradation of soils and desertification in the Trans-Sahel region of Africa (Brough & Kimenyi 2004). But livestock production remains an important source of livelihood, accounting (as of 2003) for approximately 55% to 75% of rural income (Sylla 2003). The result has been increasing pressure on the land, and increasing encroachment on farmland areas south of the Sahel and conflict with agricultural communities.

The Cyber Shepherd project involved equipping and training migrant herders in Burkina Faso, Mali and Senegal to use GPS-enabled mobile devices to plot their seasonal movements on a communal project map, and to use the map (which contained not only information about the locations of fellow herders, but also the locations of watering spots and pastureland, and information about the quality and estimated carrying capacity of the land) in order to plan their route. The mobile devices were also intended to serve as an early warning system in case of disaster (Sylla 2003).

Incomplete literacy and power and network outages were among the obstacles the project faced in the initial phase (Sylla 2003). Nevertheless, the project was seen to offer the possibility of a much more efficient and rational method of planning and coordinating the migration of herds than the traditional approach of directing herds based on scraps of information gathered at weekly markets.

By gathering crowd-sourced data on herders' positions via mobile device to reduce climate-related conflict, Cyber Shepherd exemplifies several of the principles we are discussing in this Chapter. In the following section, we explore other possible ways of applying those principles.

Possible applications of crowd-sourced monitoring techniques to climate and conflict

In this section, we consider several categories of crowd-sourced applications that could be used to illuminate the climate-conflict nexus and promote conflict-sensitive adaptation: first, voluntary initiatives; second, computational analysis of mobile phone data; and third, computational analysis of data from social media. As discussed above, market penetration of mobile telephony, Internet, and social media on the African continent is expanding rapidly. Some of the ideas presented in this section may be feasible today and others feasible in the near future.

Voluntary initiatives

SABAP2, which relies on amateur naturalists to record bird sightings for longitudinal species and ecosystem studies, is a representative example of a voluntary crowd-sourced initiative. ‘Phenology’, the study of periodic cycles in the lives of plants and animals (flowering, fruiting, molting, mating, etc.) and how those cycles vary from year to year, is an important piece of the climate puzzle, providing insight into the effects of climate change on ecological systems and agricultural systems. Phenology is well suited for crowd-sourcing techniques. Occasionally, a single individual can make useful contributions to phenology all on his or her own. For example, Henry David Thoreau’s meticulous records of the lifecycle of flowering plants in mid-nineteenth-century New England are proving useful to climate researchers today (Masangkay 2012). But generally it takes many hundreds or thousands of observers to amass the data necessary to draw robust conclusions. Bringing in masses of volunteers has other benefits as well; it makes data gathering cost-effective (compared with the staffing of ecosystem monitoring stations with professional scientists), and it generates a constituency that is committed to conservation and tuned in to climate issues. The drawback is that reliance upon lay volunteers brings with it an elevated risk of error (for example, misidentifying a plant or bird) that must be mitigated through provision of adequate training and some form of data validation. Phenology initiatives have a long history of success in North America and Europe. As far as we are aware, SABAP2 (along with its predecessor and allied programmes in South Africa) is the only phenology initiative on the African continent. We consider it worthy of emulation.

The typical phenology initiative gives participants the convenience of several options for submitting data, including electronic submission via email or web form. We propose that phenology studies would do well to take advantage of mobile phone capabilities by accepting photos along with electronic data submissions. Time-stamped and geolocation-stamped photos would give more precision and accuracy in recording the time and place of observation, and having a visual record of observed plants or animals will assist programme staff in data validation.

Voluntary initiatives could be organised to gather other types of data as well. For instance, there are certain ECVs that are not amenable to satellite monitoring, for which we are entirely dependent on field measurements. Soil carbon is one example (WMO 2010: 14). If an inexpensive way could be found to distribute soil carbon monitoring kits to a network of volunteers – as networks of ordinary citizens on two continents equipped themselves to monitor and report on ambient radiation following the 2011 Japan earthquake and nuclear plant failure – then even ordinary citizens could help solve some of the most recalcitrant problems in ECV monitoring. A voluntary data call-in for even such basic variables as rainfall and temperature could help researchers working in data-poor regions (one thinks of Sudan, an area of particular interest from a climate/conflict point of view), or researchers who desire more granularity than the current climate-monitoring and meteorological infrastructure provides. If conflict situations dis-

rupt normal life and/or telecommunications infrastructure, of course, both official and voluntary 'on-the-ground' data reporting might become infeasible.

Since professional field workers can only cover so much ground when monitoring social and economic parameters, it might be worthwhile, where local conditions and subject matter permit, to recruit volunteers for true crowd-sourced solutions. Those who conduct surveys and interviews and field observations may find that taking time-coded and geolocation-coded photographs can improve the quality and efficiency of their work. Shared web-based data submission and retrieval functionality may improve efficiency as well (though as every experienced fieldworker knows, advanced technologies are susceptible to failure and it is always advisable to have paper and pencil as back-up).

The official climate monitoring network could be considered a cousin of voluntary crowd-sourcing. One obstacle to the timely reporting of ECV data from African monitoring stations is obsolete and failing telecommunications infrastructure (GCOS 2006: 22). The example of 'Weather Info for All', discussed above, shows that the telecommunications industry is taking climate seriously and is willing to put its resources behind promising climate monitoring initiatives. Perhaps telecom providers could be prevailed upon to update and subsidise the communication links from climate monitoring stations to national meteorological organisations and the global climate community. Satellite-based telecommunication links will be better insulated from the vagaries of local conflicts than land-based links.

Analysis of mobile phone data

In theory, mobile phone account records can be mined for useful information (for example, on population movements), but for reasons discussed above, this type of analysis would be particularly challenging in Africa. Mobile phones in most parts of Africa (South Africa being a notable exception) are rarely linked with personal information that could be used to perform demographic analyses or with postal codes (or equivalent demarcations) that could be used to perform geographical analyses. Furthermore, it is not unusual for one individual to own multiple phones or for one phone to be used by multiple individuals. As long as these trends persist, mobile phone users' Internet-based activity, especially on social media, is more likely to provide usable data.

Analysis of social media

Aggregation of images taken of a single subject from multiple angles can be used to generate three-dimensional images (Snively et al. 2007). There are a number of photo-sharing online services that could be mined for this type of analysis, including Flickr, Photobucket and Bebo. These could be supplemented by images from other popular venues like YouTube and Facebook. In speculating about how photographs could be

useful to the study of climate and its effects, we start with the question: What do people (both residents and tourists) take pictures of?

One answer is breath-taking views (with or without people in the foreground). We propose that photos of Mt. Kilimanjaro and other ice-capped peaks, taken over the years from different angles, can be used to model the changing shape and volume of the ice cap. We also propose that photos taken near lakes with easily identifiable shore features can be used to detect, validate or model changes in lake levels. If such a study is undertaken, there could be a participatory component as well. Volunteers could be recruited to fully capture, photographically, the present state of the subject, and track down old photographs not yet on the Web.

Another answer is macrofauna. Geolocation-coded photographs of large mammals can help scientists plot their changing range, which provides an indication of ecosystem stress and/or climate-induced ecosystem migration. It seems plausible that as large animals move into areas where they have rarely been seen in the past, the number of snapshots would increase, thus providing a larger number of data points right at the leading edge of the range, where they are most valuable.

A third answer is extreme events. Time- and geolocation-coded photos taken by witnesses during and after extreme events could be used to model the progress of a flood, for example, or to validate satellite-based estimates of a wildfire's extent.

As described above, text-based applications like Twitter can also be mined for information on real-time or historical events and trends. Semantic analysis and sentiment analysis of data from text-based applications can provide a window into social, political and economic phenomena, including a number of hypothesised links between climate change and acute conflict. Aggregate analysis of text-based social communications could help identify and quantify – even in real time – alarm or discontent about crop yields or food prices, or hostility among ethnic groups or against governmental institutions.

This model of semantic processing could be extended beyond electronic media as well, to encompass more traditional media such as talk radio (with adequate technology to transcribe the spoken word). Local radio was, we must remember, a key instrument in the incitement of genocide in Rwanda in 1994 (Kellow & Steeves 1998), an instance of conflict in which environmental factors played a demonstrable role (Brosha 2006). Analysis of local radio broadcasts that report on (or incite, or seek to allay) smaller-scale tensions and conflicts may provide insight into causal factors, including possible climate-related links. Often such low-level conflicts do not make it to the desks of international news agencies, and are thus unlikely to be captured in the standard data sets on conflict.

Recommendations

We believe the foregoing discussion demonstrates that crowd-sourced techniques have potential to improve our understanding of the possible links between climate change and conflict and to help guide the development of conflict-sensitive climate adaptation strategies. We conclude by offering some specific policy recommendations.

1. We propose that crowd-sourced techniques be rigorously examined for their utility in monitoring ECVs, which are the foundation for any inquiry into the effects of climate change. In making this proposal, we do not intend that these methodologies be thought of as surrogates for or as short cuts around the official UNFCCC monitoring programme that has been established through a process of international negotiation and expert consultation. We believe that the new techniques could be applied in ways that complement the official monitoring programme – for instance, by validating and confirming the results of traditional satellite and in situ monitoring, and by filling gaps in the record where data from the network of monitoring stations are deficient (including in conflict areas).

In addition, we respectfully suggest that the UNFCCC consider evaluating these new techniques, as they mature and are validated, for their possible utility in the official monitoring programme. The 2010 *Implementation Plan* calls for ‘continued generation of new [monitoring] capabilities’ (WMO 2010: 22) and observes that ‘expansion of the suite of observational techniques holds the possibility of enabling climate-quality global observations of some environmental parameters not yet possible, as well as improvement of the quality, coverage, and/or cost of measurements currently being made’ (WMO 2010: 44).

There is in fact a precedent for ‘crowd-sourcing’ in the UNFCCC regime. For many years, the climate community has relied on a voluntary observing ship (VOS) network to take ECV measurements at sea. At its peak, 7 700 ships participated in the VOS programme in 1984–85 (NOAA 2009). The VOS programme demonstrates that it is feasible to integrate laypersons into the climate data gathering process, and it may offer lessons about how to do so most effectively.

2. We encourage researchers and policymakers interested in issues of climate and conflict to explore the use of crowd-sourced techniques. In many cases, crowd-sourcing is likely to be a cost-effective alternative to traditional data-gathering and analytical techniques, and it can open up data-gathering possibilities that did not exist before. Consideration will need to be given to data quality concerns as well as concerns about ethical use of data.

3. We invite those in the high performance computing, mobile technology, social complexity, and network science communities to develop new tools, methodologies and creative approaches for gathering and analysing crowd-sourced data that could be used to support the work of researchers and policymakers in the climate and conflict

arena. In this Chapter we have offered some initial suggestions of avenues to pursue. We are confident that many other ideas, suitable for translation into policy and practice, are waiting to be struck upon by enterprising technologists and data analysts working in interdisciplinary collaboration with subject matter experts.

4. Finally, most broadly, we encourage those in the research, policy and technology communities to continue to engage in dialogue about how technology can better be deployed to serve social good.

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Mediating climate change-induced conflicts over natural resources: Towards a toolbox for policymakers in Africa

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Abstract

The linkages between conflict, climate change and natural resources are increasingly acknowledged in academic and policy realms. Nowhere are these linkages more evident than in Africa, which is highly susceptible to violent conflict as a result of climate-related shocks. As resource scarcity intensifies, conflicts over high-value resources and those essential for livelihoods such as water and land may also increase, feeding into pre-existing patterns of insecurity, and exacerbating them. Mediation offers a promising tool for resolving conflicts over natural resources in a sustainable manner and oriented away from a zero-sum framework. Our understanding of how to mediate natural resource conflicts has increased, but putting this knowledge into practice remains a challenge. Enhancing mediation guidance and refining strategies for the implementation of such guidance as it relates to natural resources relies on bringing together the knowledge of a variety of experts, including scientists, social scientists and mediators. This Chapter briefly explores the risk of conflicts associated with climate change and natural resources. It then embarks upon an exploration of mediation strategies relevant to such conflicts as a tool of prevention and resolution, both in conflicts where natural resources are the major driver, and those where natural resources are addressed as a part of wider peace agreements at the political level between and within African nations.

Keywords: mediation, climate change, conflict, natural resources, Africa

Introduction

Africa is predicted to be one of the continents most affected by future climate change-related conflict, despite the uncertainty linked to climate impact scenarios as a result of a lack of data and high agro-ecological variability (cf. Giannini et al. 2008; Thiombiano & Tourino-Soto 2007; IPCC 2007a). Climate change could have significant consequences for regional stability (Miguel et al. 2004) – some notable hotspots being West Africa and the Nile Basin (Stern 2007). Scholars argue that a lack of knowledge, technology and present state fragility could undermine Africa's capabilities to deal with climate change (Brown et al. 2007; Brown & Crawford 2009), which is expected to severely impact the continent's economy (Collier et al. 2008), health (Chen et al. 2006; Hartmann et al. 2002; Pascual et al. 2006) and infrastructure (Myers 2002; McLeman & Smit 2004).

Tailored mediation and alternative dispute-resolution strategies can assist in addressing climate-induced conflicts and uncertainties, in addition to addressing the specific

challenges and opportunities linked to joint Natural Resources Management (NRM) (Salehyan 2008). This Chapter focuses on the role of mediation in the nexus on climate, conflict and natural resources, particularly addressing the conflicts caused by changes in those social systems directly or indirectly impacted by climate variations (Barnett & Adger 2007). The Chapter also presents examples of mediated agreements for transboundary NRM and conflict resolution mechanisms that have already been put in place by the African states at the international level. Finally, after exploring the challenges associated with the mediation field, the role of mediation as a tool for climate-sensitive conflict prevention and resolution is presented and discussed.

Environmental agreements in Africa: a framework for cooperation to mediate future climate-induced conflicts?

Climate change and anthropogenic activities affect ecosystems in ways that can alter supply patterns as well as the quality of natural resources (IPCC 2007b). Strategies and agreements capable of flexibly dealing with this variability and the related climate-induced tensions have been successfully put in place in some areas of the world: this is the case of some river basins, such as the Mekong, the Colorado, the Rio Grande, and the Columbia ones (Cooley & Gleick 2011).

However, most of the international treaties over the use of transboundary or shared natural resources – especially water – are based on the assumption that the quantity and quality of such resources will not substantially change over the course of time (Brooks & Trottier 2010; Varis et al. 2008). This is also the case with Africa (Thornton et al. 2006), where the ‘static’ nature of many current water agreement mechanisms could prove problematic. The majority of water agreements do not have appropriate procedures to deal with climate crises (Fischhendler 2004) and, more broadly, promote sustainable and equitable cooperation over water resources (Kistin & Phillips 2007). The impact of such ‘static’ agreements, which may not take into account the adaptations, required by climate change, is compounded by the ‘shared’ nature of many important natural resources such as water, wildlife populations and the habitats they depend upon. As these resources generally do not respect political borders they necessitate a significant level of cross-border cooperation if conflict is to be avoided. Transboundary river basins, for example, cover 62% of Africa’s total land area (Wolf et al. 1999), with two or more countries sharing eighty main river and lake basins (UNECA 2000).

There are approximately one hundred and fifty interstate agreements (including agreements, treaties, protocols and amendments) signed between the colonial period and the present day, only half of which contain specific conflict resolution mechanisms (Lautze & Giordano 2005). Most of these agreements, however, are characterised by their emphasis on water allocation, such as the various agreements concerning the Nile river (Abdalla 1971; Dellapenna 1997; Lautze & Giordano 2005) as well

as the Cunene, Inkomati, Maputo, Nile, Orange and Zambezi watercourses (Lautze & Giordano 2005) – provisions of which may be called into question if and when the resources diminish. The challenges facing Nile cooperation were compounded by the fact that the early agreements did not engage all of the Riparian countries. Lastly, the number of transboundary River/Lake Basin Organisations (RBOs) – currently ten – is considered low, given the number of basins and agreements. Those that do exist, however, have proven to be effective institutions for interstate conflict resolution, as in the case of the Niger Basin Authority (UNECA 2000).

Often problems related to the static nature of agreements are overcome by cooperation or on-going relationships (Goulden et al. 2009) and agreements with tentative built-in adaptive management mechanisms and governance structures designed to be resilient over time (Drieschova et al. 2008; Fischhendler 2004). A case in point, in regards to adaptive governance structures, is the case of the treaties over the Orange-Senqu river (Kistin & Ashton 2008) managed by the Orange-Senqu River Commission (ORASECOM), composed of Botswana, Lesotho, Namibia and South Africa in Southern Africa. Water cooperation has been mainly facilitated by bilateral and international formal mechanisms – the most representative being the Southern African Development Community (SADC) Protocol on shared Watercourse Systems signed by Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. Most notably, acknowledging the need for both equitable sharing of water resources and adaptability, the Orange-Senqu riparian countries put in place a set of treaties and agreements that incorporate flexibility to periodically review allocation strategies, as well as to address climate variability through adequate plans for drought response. This example well represents the status of cooperation over water in Southern Africa, where despite high seasonality and water stress (Goulden et al. 2009), the joint international management of water resources has mainly been a driver of cooperation rather than conflict (Turton et al. 2006).

Similar adaptive management mechanisms in water agreements are present in the case of the Nile Basin, where some degrees of flexibility in response to water variability were embedded in bilateral agreements (Conway 2005). The Nile Basin Initiative (NBI) was formally launched with the support of the World Bank in 1999 and composed of the water ministers of the countries then sharing the watercourse (Burundi, the DRC, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda). The challenges facing Nile cooperation were compounded by the fact that the early agreements did not engage all of the Riparian countries through comprehensive agreements or a single river basin organisation (Goulden et al. 2009), even though a number of bilateral disputed treaties are in place since the Nineteenth century (UNECA 2000; Waterbury 2002). The NBI is one of the most renowned and paradigmatic examples of interstate cooperation over water management in Africa. Indeed, this initiative shifted the nature of cooperation on the Nile from exclusive arrangements between a limited number of Nile Riparians to an inclusive approach that brought all relevant countries on board (Wirkus & Böge 2006). The Basin countries are currently adapting to rapidly

changing political circumstances with the recent changes in Egypt and the emergence of South Sudan as a new state. In the midst of these changes, relations between Egypt and Ethiopia have improved significantly in contrast to the long history of antagonism between the two over Nile related issues (Cascao 2008; Conca 2006).

One of the key outputs of the NBI, the Cooperative Framework Agreement (CFA), may now be ratified by all countries setting the legal framework for a new era of cooperation on the Nile able to match the required adjustments in river basin management needed for a (conflict-sensitive) adaptation to climate change (Cooley et al. 2009, Gleick 1990). The CFA builds on the principles of customary international water law to establish a foundation and governance mechanism for developing mutually beneficial arrangements and adapting to unforeseen changes, many of which will be induced by climate change. Specifically, it is expected that the CFA will incorporate key principles of customary international water law that are likely to facilitate cooperation and dialogue towards conflict-sensitive adaptation to climate change. Indeed, according to customary international water law, states are expected to use an international watercourse in an 'equitable and reasonable way' (UN 1997a) and preventing any 'significant harm' (UN 1997b) to co-riparian states. In addition, states are expected to timely notify (UN 1997c) co-riparian states and consult with them (UN 1997d) about any new use or change in an existing use of the shared watercourse, in order to prevent significant adverse effects on the co-riparian states. Such principles are expected to represent the foundational basis of the new agreement on the Nile River Basin. The previous work of the NBI could also play an important role in shaping climate-proof conflict prevention policies in the river basin (Link et al. 2012), thanks to the NBI activity as a hub for co-riparian states to share data, information and research (Cooley et al. 2009). Finally, the CFA further has the opportunity to build on existing mechanisms already formally established by the Nile River 1959 treaty (Pionket 2010) to review water allocations in light of extreme events and future demands.

Based on the recent activities of the upstream riparian countries¹ (Africa Research Bulletin 2010; 2011), the new agreement is expected to enter in force soon, thus providing the necessary institutional mechanisms to help facilitate adaptation to climate-induced changes, and mediate related conflicts. Such a cooperative approach for the management of the Nile River Basin would definitely be needed, as both climate (Martens 2011) and political (Salman 2011) shifts make the old regime inadequate to respond to expected future changes. In particular, unilateral large-scale initiatives (e.g., diversion of river waters for irrigation in Sudan, construction of hydroelectric power dams in both Ethiopia and Sudan) are spreading (Swain 2011). Global change could thus act as a catalyst for a more equitable sharing of the Nile river resources (Sanchez & Gupta 2011).

1 Africa News Service (2011) Why South Sudan is Egypt's new headache over Nile water treaty. *The Nation* (Kenya), July 26.

With regard to interstate cooperation agreements for environmental conservation, it is interesting to examine the African Convention on the Conservation of Nature and Natural Resources², signed in 2003 by each African state within the AU framework. Environmental protection mechanisms in cases of interstate conflict are foreseen in the Convention, which expects states to: protect the environment against harm during conflict; refrain from causing harm to the environment as a means of combat; and undertake restoration/rehabilitation efforts in environmentally damaged areas. Moreover, the creation of an Interstate Commission is recommended for water-related conflict resolution; for other environment-induced disputes the Convention envisages parties' agreement either through direct settlement or a third party, with the AU Court of Justice to solve the dispute if not settled within twelve months.

African states have also offered positive examples of environmental peacemaking/peacebuilding through cooperation, meaning the joint management of natural resources as a tool for conflict prevention and resolution and for peacebuilding in post-conflict settings (Dabelko 2008). The creation of transboundary 'peace' parks became an asset for regional cooperation between formerly hostile countries, as happened with the Ai-Ais Richtersveld Transfrontier Park co-managed by South Africa and Namibia. Another joint effort for nature protection, managed by formerly hostile African states, is the International Gorilla Conservation Programme, implemented by the DRC, Uganda and Rwanda. Regional joint action has also helped prevent the escalation of conflict as a result of natural resource competition in the Great Lakes region. In 2010 during the International Conference on the Great Lakes Region (ICGLR) member states organised a summit for discussion over the illegal exploitation of natural resources³, agreeing on the adoption of a set of policy tools to curb their illegal exploitation.

As a conclusion, it can be said that the cases listed in this section show that African policymakers can build upon a number of successful interstate adaptive environmental agreements. These experiences represent a key source of best practises and lesson learned for the future development of conflict-sensitive adaptation policies and the mediation of climate-proof environmental agreements.

Unlocking the promise of mediation

It is evident that the risks of climate-change induced violent conflict are likely to increase, threatening lives and livelihoods of those directly affected, as well as the security of the African region as a whole. While the positive examples above provide some indication of cross-border cooperation and effective management of natural resources, demographic pressures and shocks to the environment may raise the stakes of natural

2 The Convention is available at: http://www.africa-union.org/root/au/Documents/Treaties/Text/Convention_Nature%20&%20Natural_Resources.pdf [Accessed 6 February 2012].

3 Summit Declaration available at: <http://www.oecd.org/dataoecd/33/18/47143500.pdf> [Accessed 1 March 2012].

resource-related conflict, increasing the need for solutions which can also cope with the likely continued changes in the future.

Mediation⁴ can make a contribution to climate change-conflict challenges, by increasing the capacity of potentially conflicting parties to negotiate solutions to emerging problems. As a procedural tool, mediation can be used to prevent, de-escalate and resolve conflict. In order to use mediation more effectively, it is essential to develop a deeper understanding of when mediation is appropriate, what mediation can and cannot achieve, the specific techniques that can be successfully applied in different resource conflict situations⁵ and how the outcomes of mediation can be implemented, monitored and managed. And, more importantly, the use of mediation needs to be demystified and integrated into the transboundary resource conflict management toolbox where it can contribute to solution building along with many other tools that are of a more technical nature. This requires a parallel realisation amongst the parties involved that more may be achieved through such a process than by a continuation of conflict.

Our understanding of mediation broadly, and as it relates to natural resources specifically is still in the process of evolving. It appears that the practice of undertaking research on peace mediation and international peace processes suffers from some significant challenges that can hamper our ability to learn and refine the tool. It is our (the authors') experience that due to the inherently confidential nature of peace processes, for example, mediation can be an isolating activity which places intense demands on the lead mediator and the mediation support team. The rapidly changing dynamics behind closed doors, combined often with local, regional and international pressures to reach an agreement, leads to a situation in which the mediator must make decisions quickly, and often with only partial knowledge of how similar challenges have been addressed in the context of other peace processes. Mediators working on intractable conflicts rarely have the opportunity to compare notes on strategy, and certainly not in any methodical or concerted manner.

Approaches to strategy and tactics, therefore, tend to be ad hoc with little or no opportunity to generate best practices, other than those based on the individual accumulative experiences of any given mediator. Indeed, mediation at the international level especially is often shrouded in secrecy and accessible only to those around the negotiating table and the small team of individuals supporting the process; the process itself demands a high level of secrecy, given the high political stakes and risks of the process collapsing if details are leaked at the wrong moment.⁶

4 Mediation in this context is defined as negotiation that is assisted by an impartial human resource such as the secretariat of transboundary resource management commission, staff from a multi-lateral regional agency, or an independent mediator jointly retained by the parties in a conflict.

5 For further suggestions on mediation techniques see Grzybowski and Kaye (2012).

6 For an example of the need for confidentiality at critical moments, see Lindenmayer and Kaye (2009).

The element of secrecy is compounded by the perception amongst many that mediation is a field based on inherent talent rather learned competency; in fact, 'even professional mediation experts assert that mediation is not only a job, or an assignment, it is an art' (Myint-U 2006a: 94). The ability of a mediator to succeed – that is, the strategies and tactics he or she uses during the course of the peace process – is perceived as personality dependent and difficult to qualify. Many aspects of mediation, therefore, especially those aspects associated with managing the process itself above and beyond issues such as elections, constitutions and power-sharing agreements are largely ignored, seen as inherently too political and abstract, or relegated to the domain of an art form, a skill set which the mediator either has or does not have. Consequently, mediation is seen as 'the preserve of gentlemen, rather than a professional niche requiring skills and training' (Myint-U 2006a: 94).

The context in which mediation takes places has also changed the way it is perceived. Given the evolving nature of conflict in the post 9/11-world, and in the context of the renewed push for dialogue under the Obama-administration, peacemaking is increasingly under the spotlight and expected to deliver sustainable solutions in arenas where military options are failing. The skills needed to address the increasingly intractable, regionally spread and globally driven conflicts of the 21st century, however, are not the same as those needed by traditional diplomats working in the context of the Cold War where inter rather than intrastate conflicts were the norm. And yet, the UN, regional organisations and third party states are accused of increasingly being 'unwilling and ill-equipped to deal with non-state actors labelled as guerrillas, rebels, or terrorists' (Thornton 2010), groups which are some of the most dominant actors in conflict today – often including those in which natural resources are a driving or component element of the conflict.

Until very recently, the UN and regional organisations have made few concerted efforts to generate lessons learnt in this field, and almost no institutional memory currently exists in the mediation domain broadly let alone in the natural resource field. Indeed, '[d]espite being the world's pre-eminent international mediator for six decades, there is very little knowledge of past experience, let alone a good system for ensuring that lessons are well learned. What memory there is rests in individual people rather than in the organisations [UN system] itself and these people are few and far between' (Myint-U 2006b: 92). Even in instances where the UN is not the most suitable actor for the specific mediation activity or peace process in question, it remains the most suitable norm-setter and institution to turn to for advice and support, and there appears to be an emerging consensus that it would benefit from making a much deeper and broader effort to enhance and maintain its status as a reference point for peacemaking efforts.

These above points, combined with the vast proliferation of mediation actors on both official (Track I) and unofficial (Track II) diplomacy levels, have led to the perception of mediation as an unregulated field in need of professionalisation and demys-

tification. This perception threatens to raise questions that delegitimise the field at a time when the demand for mediation – not least in the natural resource domain given the pressures on essential resources such as land and water – is increasing. Calls to improve and strengthen the field have come from a variety of major actors: mediators at the annual Henry Dunant Centre for Humanitarian Dialogue (HD Centre) Oslo Forum – a regular and significant contribution to generating lessons learnt – lamented the fact that ideas arising during the exchange of experiences at such conferences ‘tend to be lost and do not feed into a process’ (HD Centre and Norwegian Ministry of Foreign Affairs 2009). The International Peace Institute blue paper on mediation suggested that a ‘handbook on UN mediation for incoming representatives and envoys of the Secretary-General could also help them work more effectively from day one’ (Mikulaschek 2009: 24). The same paper suggested that the ‘UN Secretariat should work closely with academic institutions and think tanks that can provide specialised training courses to its staff’ (Mikulaschek 2009: 25).

It seems these criticisms have been heard loud and clear by UN agencies and departments, and Member States. The Mediation Support Unit at the United Nations Department of Political Affairs (UNDPA), for example, has made deep and important contributions to improving guidance for mediators on technical issues, and the Stand-By Team – made up of a wide range of experts – is frequently deployed in support of peace processes around the world. In 2010, two experts in ‘Process Design’ were added to the roster, signalling recognition of the need for such experts (UNDPA 2010). Similarly, for example, the Swiss Peace Foundation (Swisspeace), the Swiss Federal Department of Foreign Affairs and the Centre for Security Studies (CSS) at the ETH Zurich organise an annual ‘Peace Mediation Course’ specifically designed to train mediators and mediation practitioners in the ‘nuts and bolts of negotiating and mediating peace agreements’ (Mediation Training Platform 2012).

Most significantly, however, UN General Assembly Resolution 65/283, *Strengthening the role of mediation in the peaceful settlement of disputes, conflict prevention and resolution* was passed in July 2011. Building on the Report of the Secretary-General of 8 April 2009 on enhancing mediation and its support activities, the Resolution marks one of the most significant global recognitions of the importance of mediation and of the need for a more concerted effort to strengthen the mediation capacities of the UN system. Amongst many significant requests, the resolution ‘[s]tresses the importance of well-trained, impartial, experienced and geographically diverse mediation process and substance experts at all levels to ensure the timely and highest quality support to mediation efforts, supports the efforts of the Secretary-General in maintaining an updated roster of mediators, and encourages the continuing efforts to improve its gender balance and equitable geographical representation’ (A/RES/65/283). The resolution ends with a request for the Secretary-General to submit a report on the implementation of the resolution. The Report is expected during the course of 2012.

Tailoring strategy for success

The resistance to address some of the above challenges in a more concerted, institutionalised and global manner may have been the result of multiple factors. It is possible that some policymakers may see the concept of mediation strategy as inherently political and beyond the scope of an external advisor, since it is dependent on the mediator in question, his or her preferences and the context in which the process takes place. An intensely political activity, many member states may have resisted attempts to strengthen the field for fear it may threaten their sovereignty. Some policymakers may simply reject the notion that guidelines or advice can be given in this domain because mediation is a creative process, and any rules or procedures would inhibit flexibility, acting as a 'straight jacket' (Herrberg 2008).

As Resolution 65/283 makes clear, strengthening and professionalising the field need not necessitate a rigid structure or the elaboration of strict rules. Alluding to a comparative-based methodology, the resolution emphasises the need for 'guidance for more effective mediation, taking into account, inter alia, lessons learned from past and ongoing mediation processes' (A/RES/65/283). Comparative knowledge is particularly useful as it enables the mediator to draw upon the experiences of his or her peers, to avoid failures and build upon successes, all the while adapting that knowledge to the specificities of the situation at hand. Indeed, 'though every situation is different, and though a proper understanding of the local context, local history and local politics is essential, it would also seem that every peace process has something to learn from past failures and successes' (Myint-U 2006a: 94).

There is no causal mechanism between strategy and success, and any formulaic approach to mediation is likely to fail not least due to the increasingly complex and highly dynamic nature of today's conflicts. However, a body of knowledge based on the skills, experience and expertise of hundreds of mediators, which can be analysed by mediation experts, and adapted to the situation at hand would contribute to a professionalization of the field. It would also enable mediators – both those working on conflicts induced by climate change and those working on broader peace negotiations – to make decisions based on an expansive and evolving field of knowledge. Given the increasing likelihood of natural resource related conflicts in the years in light of demographic stressors and climatic change to come, an international 'stock-taking' of experiences in this field would be highly beneficial. The UN Secretary-General's response to the Resolution will be instructive in this regard.

Designing a mediation strategy: natural resource-specific challenges and opportunities

A focus on mediation strategy is concerned specifically with the way in which the mediator goes about facilitating dialogue to foster an agreement that will be implemented,

sustainable and that addresses the root causes of the conflict. We believe that process considerations are an essential component of any mediation strategy, and need to compliment substantive and technical considerations – not least given the complexity of natural resource issues, and their inter-relationships with other social, economic, political and cultural factors.

Whether related to natural resources or other types of conflict, important issues which need to be taken into consideration include: finding entry points and creating effective channels of communication; dealing with asymmetry of power and knowledge between the negotiating parties; developing a common understanding of the issues and the relevant information; dealing with intense emotions and cultural differences behind closed doors; shifting the negotiations into a mutual gains and interest based approach away from the conventional positional strategies and tactics; building a bridge between the negotiating room and the public; using the media, involving civil society and managing spoilers; and, building and maintaining regional and international support. These process issues are fundamental to many public policy related mediation processes particularly those that relate to publicly owned resources.⁷

Besides the need for more research on the process, strategies and tactics which can be useful when mediating natural resources issues, the field would also benefit from increased communication between practitioners working on different types of natural resources. The current approach has tended to be largely 'siloe'd' with solid but segregated works on mediating agreements over land, water or wealth-sharing (cf. Haysom & Kane 2009), with a focus on the technical aspects above and beyond the equally important procedural aspects of the mediation process. Alternatively, guidelines for practitioners tend to focus on community-focused mediation (e.g., Castro & Engel 2007; Engel & Korf 2005) activities, paying much less attention to the role natural resources play in national-level peace agreements on the one hand, and tending to be based broadly on mediation techniques such the importance of an interest based negotiation approach, without taking into account the specifics of natural resource-related mediation.

When compartmentalised or lacking in focus, academic research and policy guidelines, as well as mediation practice, miss important similarities between natural resources, and tend to ignore the essentially inter-related nature of natural-resource issues. Negotiations over water or extractives, for example, may have important implications for land issues and vice versa (Castro & Engel 2007; Engel & Korf 2005). Furthermore, knowledge gained from mediating in one sector could prove to be very useful for mediators working in other natural resource sectors. Indeed, natural resources, despite the diversity – especially between livelihood-centric and high-value resources – demonstrate significant unifying qualities.

As mentioned in the previous section, mediation strategy design should be tailored to the context at hand, and draw upon tried and tested knowledge and insights.

7 For more information see Grzybowski and Kaye (2012).

When focusing on natural resources specifically, a mediator should be aware of the role that a particular resource plays in a community, the meaning it has, what role it plays in the conflict and how it ties in with social, political, cultural and economic factors; at local, regional and national levels. This will assist with the development of a much more nuanced mediation strategy, one which is more likely to keep all stakeholders on board the process through to its logical conclusion. There are several basic foundational blocks for this understanding, which are derived from years of experience working on natural resource issues from a mediation perspective (Castro & Engel 2007; Engel & Korf 2005).

First, an important material resource, natural resources are often also the basis for a particular way of life – as a fisherman, farmer or miner, for example (Mwanika 2010). As such, when there is an increase or decrease in the supply or demand of any particular natural resource, it has a significant impact on the livelihoods of rural populations especially. Second, if communities have a historically long association with particular natural resources, they take on important symbolic and sometimes religious significance, which needs to be taken into consideration during the course of negotiations (Mwanika 2010: 5). Third, whether renewable (such as land for farming) or non-renewable (such as minerals) natural resources have important implications for the economy and, if harnessed constructively, can be instrumental to sustainable state-building processes. Conversely, if mismanaged, natural resources can easily feed into the war economy and provide parties with incentives to pursue or continue violence rather than coming to the negotiating table. It is a sad irony that natural resource wealth, particularly extractives, have in large measure represented a curse more than a blessing by overwhelming local economies, disrupting communities and reinforcing corruption (Bannon & Collier 2003). Indeed, because of the pivotal role played by natural resources at both local and national levels, conflicts over their ownership and use can be very intense, and can easily escalate into violent confrontation (Buckles & Rusnak 1999). Over the past sixty years, 40% of civil wars can be associated with natural resources and since 1990 there have been at least eighteen violent conflicts fuelled by the exploitation of natural resources (UNEP 2009). These are just a handful of the initial considerations a mediator may like to take on board.

Policy considerations: mediating climate change-induced conflicts over natural resources

Notwithstanding the legacy of natural resource-related conflict, natural resources do provide incentive for cooperation, the promise of sustainable economic development and poverty alleviation. Part of the challenge in shifting to these positive outcomes involves strengthening the capacity of mediation and negotiation processes to generate mutually beneficial and sustainable outcomes to natural resource issues as part of broader political conflict resolution and management processes.

With this in mind, it is essential to promote research aimed at gaining insights into the models and strategies associated with successful natural resource-related conflict mediation, and a deeper understanding of best practices as they relate to transboundary resources, pollution and border issues; extractive industries; land and settlement issues; ecosystem degradation and biodiversity conservation. It is already clear that a systematic approach to mediation that builds interest-based outcomes on a common information base while engaging civil society in a meaningful way is key to improving practice.⁸

Another critical component of climate change adaptation is the governance mechanisms that are established to manage the implementation of agreements and adjust the terms as unforeseen events emerge. Such mechanisms need to be capable of adjusting and adapting to climate-induced changes to natural resource quantities and quality even after the agreements have been reached. As noted, the experience with governing transboundary waters is still in its early stages. However, river basin organisations are increasingly preparing for the adaptations that will be required as the impact of climate change become manifest (GEF 2009; GEF et al. 2012). For example, climate-induced impacts are a priority research topic for research and analysis in the Columbia (Canada and US Entities Treaty Review Process), and the Aral Sea Basin (International Fund for Saving the Aral Sea).

As practitioners refine mediation strategies for natural resource conflicts, it is important to be cognisant of the differences in conflict dynamics between renewable and non-renewable resources. Also, there may be a useful separation between resources spread across large areas (e.g., grasslands, forests and agricultural land) which require participatory spatial planning models to secure sustainable solutions to issues; and those concentrated in one location such as high value mineral deposits where the focus is often on negotiating the distribution of benefits and the mitigation of negative impacts. Both of these types of natural resources are susceptible to climate-induced change for quite different reasons: spatial plans can for instance be easily compromised by changes in rainfall distribution, while impact benefit agreements may include provisions to mitigate impacts or develop a stream of benefits that are vulnerable to climate-induced change (e.g., clean water supplies and infrastructure for agriculture development).

From a mediation process perspective, bringing the parties together into a joint learning process in advance of formal negotiation helps build a common information base. At the same time, preparing the parties to engage in interest based dialogue and negotiation helps set the stage for success. Gathering the information and exploring potential solutions can be fruitfully conducted in a 'without prejudice' manner, enabling the parties to explore solution options and to develop an improved understanding of each others' interests. This will contribute to establishing less polarised relationships

8 For further reference on mediation techniques see Grzybowski and Kaye (2012).

and increased trust, thus promoting the reaching and implementation of agreements as well as adjusting those agreements in response to unforeseen events, some of which may be related to climate change.

In order to provide a framework and foundation for specific natural resource conflict mediation, research that synthesises the analysis of specific case studies with insights of a wide range of practitioners is essential. Comparative analysis of mediation processes can help overcome the challenges associated with the secrecy element, by drawing out the broad lessons without delving into the specifics of the case at hand.

Conclusion

Climate change-induced conflict over natural resources is likely to affect Africa more than any other region in the world. Populations living across the African continent have a high dependence on natural resources such as land, water and marine life for livelihoods. Moreover, the continent suffers from weak institutional mechanisms to deal with high-value natural resources such as oil and gas, which in turn affect livelihoods. Conflict is not only a risk, but is predicted to be violent in nature, unless mitigating actions are undertaken and built into the fabric of relevant governance structures and processes. In particular, these structures and processes anticipate the need for decisions that proactively adapt to climate change-induced alterations in ecosystems, water supplies and the economic and cultural arrangements that depend upon them.

Mediation as a tool to resolve climate change-induced conflicts over natural resources is therefore likely to be increasingly required in the years ahead and best practices in the field of mediation need to be deployed much more effectively. Given the very tangible nature of peace agreements, research to date has tended to focus on technical and material aspects of mediation, paying significantly less attention to mediation processes, that is, the 'how-to' of mediation. Furthermore, practitioners working on natural resources suffer from a siloed approach to, for example, water or land agreements, missing important similarities between these resources, as well as significant opportunities for cross-learning.

In addition to more research, broader application of good mediation practices is urgently required, supported by a greater appreciation amongst conflicting parties that mediation is a process that can expand their capacity to resolve their differences, rather than something mysterious that can potentially undermine what little control they may have in securing beneficial outcomes to their conflicts. The UN General Assembly Resolution on mediation is one step in this regard and the Secretary-General's response could be particularly important. Another essential and practical step is to more fully integrate mediation into the conflict management toolbox used within existing and new transboundary and domestic governance mechanisms, while at the same time challenging these mechanisms to adapt to changes, climate-related and otherwise.

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Annex: Memorandum for action

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Purpose

Climate change is considered to be a threat multiplier. Its adverse consequences will affect nations with low adaptation capacities hardest in the decades to come and decisive action is needed to prevent social tensions and conflicts.

This Memorandum provides guidance and aims to support advocacy efforts where action can be taken on the climate-conflict nexus and to promote adaptation as a peaceful response to climate change. It differs from the rest of the chapters in this volume, in that it is a short, succinct and, importantly, an actionable document that can be used by the policy community and practitioners to take practical steps towards conflict-sensitive adaptation to climate change. This Memorandum also draws on the findings of the research project ‘Strengthening of approaches and instruments as well as promotion of processes to reduce the security risks posed by climate change in the context of climate change adaptation’¹ (Tänzler et al. 2013). In regards to the results of key international discussion at the UN and the EU level, we draw on:

- The 2011 UN Security Council meetings on climate change as a security threat and the unanimous presidential statement (UN Security Council 2011) adopted as a result of the 2011 debate.
- The report of the UN Secretary General titled ‘Climate Change and Its Possible Security Implications’ (UN General Assembly 2009) outlining, among others, that adaptation to climate change may serve as a threat minimiser.
- The Joint Reflection Paper of the European External Action Service and Services of the European Commission (2011) titled ‘Towards a Renewed and Strengthened EU Climate Diplomacy’.
- Council of the European Union (2009) conclusions on Climate change and security, during the 2985th Foreign Affairs Council meeting Brussels, 8 December 2009.

1 This research project was funded by the German Government and was based on three regional adaptation roadmaps developed for the Andes region, Central and South Asia, a review of regional processes and programmes as well as expert consultations. To ensure that the results of the projects can be considered in national and international policy processes and to strengthen international governance for adaptation this Memorandum for action was developed outlining major principles to support processes for adaptation and peace. It is based on expert consultation conducted, among others, during the Conferences of the Parties to UNFCCC in Durban 2011 and Doha 2012.

- The joint report by the High Representative of the EU and the European Commission (2008) to the European Council titled ‘Climate Change and International Security’.

The aforementioned sources provide compelling analyses of the implications of climate change impacts on peace and stability, especially in crisis and conflict prone areas. They also highlight a number of challenges, but also potential starting points for further action – with many identified in this volume. Of particular importance is the ability of governance structures and institutions to manage adaptation to climate changes, not as an isolated technical effort, but as a multi-level, holistic, long-term, and conflict-sensitive approach.

Adaptation and peace

- Adaptation is defined by the IPCC as an ‘adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities’ (IPCC 2007: 869). Adaptation is, hence, more than a mere technical challenge. It requires empowering people, building their resilience and securing livelihoods.
- By ensuring effective local action, national coordination, and international cooperation, peaceful processes of transformation can be fostered. These multi-level processes need to be supported by the long-term engagement and financial support of the international community. In addition, the scope of adaptation action depends on the context in which it is operating: many countries and regions are already today prone to crises and conflicts which require due consideration when planning and implementing programmes and projects.
- Accordingly, UN Secretary General Ban Ki-Moon stressed in his 2009 report on climate change and security to the UN General Assembly (2009: 2) that many developing countries would benefit from a comprehensive programme of institutional capacity-building for climate change adaptation including institutions for prevention, mediation and the peaceful resolution of conflicts.

Seen in this light, adaptation can:

- (1) *serve as a peace builder being a catalyst for dialogue and peaceful conflict resolution*
Public authorities and user groups may be able to use non-violent conflict resolution techniques to help implement necessary, but unpopular adaptation measures, such as population resettlement and the negotiation of appropriate compensation packages. By increasing their ability to adapt to climate change, stakeholders are also likely to increase their social resilience and thus improve

their capacity to achieve peaceful conflict resolution and conflict transformation in other areas of society.

Adaptation therefore has the potential to empower countries to better withstand various social and economic stressors, while avoiding the destabilisation of their governing institutions and societal structures. If adaptation processes are participatory, they can ideally give marginalised groups a voice to integrate their concerns in building resilient communities.

(2) *be a potential cause of, or contributing factor to, conflict through processes of 'maladaptation'*

Adaptation measures may generate friction or resistance, predominantly from those who profit from the status quo or are interested in diverting adaptation-related funding for other purposes. In a worst-case scenario, adaptation measures may also potentially be a direct cause of conflict. When two or more states or regions share the waters of a river, for example, climate change adaptation measures may increase the likelihood of confrontation between upper and lower riparian populations.

At the local level, there are examples of tensions in the course of addressing competing demands for available water supplies. This was the case in different local contexts, where efforts to provide communities with additional water taps also stirred tensions; as an initial effort, taps were located sparsely, benefiting the selected communities, but angering neighbouring communities without taps. With the increasing availability of funds for adaptation purposes, the overall questions of how to distribute assistance equally among affected communities and how to avoid risks of elite capture, corruption and organised crime need to be addressed.

(3) *be hindered by sudden or long-lasting conflicts*

Analysis of international support for adaptation suggests that not all fragile or conflict prone countries benefit to the same degree from support given to establish adaptation frameworks. To avoid a situation in which climate change further increases the risk of destabilisation or violent conflict, conflict-sensitive adaptation needs to be ensured – especially during processes of peacebuilding and consolidation.

The enormous challenges for adaptation processes in this context most recently became obvious in the case of countries affected by violence, where as a result of the most recent conflict, on-going and planned adaptation projects have been frozen with no clear indication as to when and how activities to diversify the country's agricultural production will continue.

Political entry points for action

- There are a number of processes that can help to address the peace potential of adaptation. On the one hand, the international climate change negotiations have been active in establishing international guidance for adaptation activities. On the other hand, different activities at the UN or EU level illustrate that climate change adaptation has already entered decision making agendas in other policy domains such as foreign and security policies.
- The UN has called attention to the need for adaptation in the context of global security, particularly in a UN Secretary General report on climate change and security published in 2009. However, these summons to action have remained somewhat vague about how adaptation policies might be designed and implemented, thus preventing countries from taking concrete action. One reason for this situation may be that most security policy discussions and deliberations over adaptation take place in separate political arenas, with minimal exchange between the two fields.
- As part of the international climate change process, there are several starting points to promote mainstreaming of adaptation into other policy areas and to acknowledge co-benefits of adaptation for peace and stability – especially in countries and regions affected by tensions and conflicts:
 - NAPAs and NAPs: 21 of the National Adaptation Programmes of Action (NAPAs) for least developed countries submitted to the UNFCCC were developed in countries considered to be states at high risk of destabilisation. The next step is to move to more comprehensive national adaptation plans (NAPs) which should facilitate the coherent integration of climate change adaptation into relevant new and existing policies, programmes and activities. The guidelines to develop NAPs by the Least Developing Countries Expert Group (LEG) recommend participatory approaches for national adaptation planning and also acknowledge the importance of regional adaptation processes.
 - Adaptation Fund and the Least Developed Countries Fund (LDCF): To design and implement concrete adaptation projects and programmes in developing countries, the Adaptation Fund will likely offer incentives to institutionalise national processes to increase adaptive capacities. The same is true with respect to the Green Climate Fund which is currently established. National or Regional Implementing Entities (NIE/RIE) can facilitate direct access to these funds based on the provision of good financial governance.
 - Loss and Damage: Most recently, the international climate negotiations have also started to deal with negative effects of climate change that people have not been able to cope with or adapt to, despite efforts to take best practice

adaptation measures. Although concrete provisions are still subject to negotiation most vulnerable countries can expect support to become more resilient.

- o Other donor initiatives: More substantial funding to promote adaptation and to build resilience is available from other donors such as the World Bank.

Adaptation as peace-builder

In order to support the contribution of adaptation to peace and stability, we suggest that decision-makers from national governments and international donor agencies consider six main principles for adaptation for peace that can be translated and implemented in three main focus areas:

6 Principles for ‘adaptation and peace’

1. Establish peace and conflict assessments for adaptation programmes and projects going beyond a pure technical understanding of adaptation;
2. Mainstream climate change adaptation in conflict-prone contexts applying conflict sensitive approaches;
3. Ensure participatory processes to design and implement adaptation measures in an inclusive manner;
4. Build robust governance structures linking local, national, and regional levels – also in order to foster transparent and accountable spending;
5. Use training/capacity building approaches to understand and address current and future conflicts; and
6. Ensure coherence of climate change adaptation and development processes nationally and internationally.

Focus 1: Establish conflict-sensitive adaptation practices

Target Groups: Practitioners, Policy Planners, Donor Agencies, Governments

Activity level: local/national/transnational

- Conflict-sensitive adaptation should allow decision-makers to address vulnerabilities to climate change as well as development priorities, while aiming to

ensure long-term sustainability and peace through a basic understanding of the consequences of political decisions under climate change conditions.

- Specifically, conflict sensitivity means the ability a) to analyse and to understand the context in which one is operating, working and intervening, b) to understand and to anticipate the interaction between one's own intervention and the context, and c) to build the capacity to act upon this understanding, in other words, to avoid negative impacts and maximise positive ones. Hence, climate change adaptation is 'to do no harm', but 'to do good', and to understand the context in which one operates.
- Conflict-sensitive adaptation will be especially crucial in areas where there is high dependence on natural resources and which are already known as conflict prone due, e.g. to an existing history of conflict. Therefore, analyses are needed to understand a variety of factors including the general context, based on e.g. peace and conflict assessments but also on improved methodologies to measure the impact of adaptation interventions.
- Adaptation measures should be better integrated into countries' development initiatives and poverty-reduction campaigns. Embracing a systematic, integrated approach to creating NAPs, e.g., can help to improve the conflict-sensitive design of these policy interventions.
- Capacity building support for conflict-sensitive adaptation policies is needed. Based on a more detailed picture of the overall context, support for capacity building is needed to avoid climate change-related conflicts at the local level. To this end, training can be organised and offered to relevant stakeholders, ranging from public sector representatives to those active in the field of natural resource management and members of country delegations in selected regions.

Focus 2: Promote regional adaptation processes

Target Groups: International Organisations, Donor Agencies, Governments

Activity level: (mainly) transnational

- The international climate negotiations have so far primarily focused on the national support to design and implement policies and measures for adaptation. Climate change, however, takes place across national borders. Adverse impacts are of a transboundary nature, leading to similar climate-related risks in neighbouring countries. Thus, regional solutions need to be developed to cope with adverse regional impacts.
- Common vulnerabilities and similar adaptation needs seen by neighbouring countries offer vast potential for dialogue, coordination and cooperation. When

dialogue and the exchange of experiences help to build trust among neighbours, this can have stabilising effects on an entire region.

- A further step towards regional climate adaptation-related initiatives could potentially lead to the development of a common perspective towards adaptation, serve as a starting point for broader cooperation in the region, help, e.g., to prevent controversy on the use of transboundary water resources and may also yield positive results in other issue areas.
- Based on the identification of joint vulnerabilities and needs, regional initiatives and even regional adaptation roadmaps can be designed and implemented, e.g. to ensure water and food security. Such initiatives may likely not require the establishment of new institutions but can be built on already existing initiatives. The idea to establish Regional Implementing Entities to spur on adaptation can complement these approaches.
- Regional adaptation approaches could to a limited extent decouple the overall success of adaptation activities in a region from single national circumstances and developments – balancing individual country’s ambitions and capabilities for adaptation and taking the role of an “institutional memory”, should adaptation processes in one country be interrupted.
- Early communication of national adaptation plans and projects with potential transboundary impacts can help to prevent maladaptation and tensions with neighbouring countries. Thus, supporting regional cooperation on adaptation should also follow criteria of conflict-sensitive adaptation.

Focus 3: Strengthening international governance

Target Group: Negotiators, Donor Agencies, International Organisations

Activity level: local/national/transnational

- International climate negotiations have already established basic support and learning mechanisms to facilitate adaptation. Processes to develop NAPAs and NAPs put a strong emphasis on ensuring participatory processes to support an equal representation of stakeholders. In addition to the existing framework, the consideration of conflict-sensitive adaptation guidelines can be further strengthened, e.g. through a special report by the LEG.
- Building strong, supportive institutions for climate change adaptation is a key priority in crisis and conflict-prone areas. Institutions responsible for climate change adaptation – whether under the UNFCCC, international financial institutions, development agencies, or peacebuilding organisations – need to ensure

that their internal systems and structures promote adaptation even where there is no existing state fragility or conflict.

- In July 2011, the UN Security Council asked the UN to provide regular information on how climate change may endanger peacebuilding processes and, hence, the mandate of the UN Security Council. The international climate negotiations can, as part of the on-going mandate, work on a number of points such as: facilitating adaptation governance; addressing the risks of loss and damage; facilitate knowledge generation and sharing on how climate change may endanger processes to build peace; and report back to the UN Secretary General.
- Access to climate financing should be built on a strong framework for enabling good financial governance by enabling the direct access of national entities in order to support learning on climate change adaptation. Here, a special focus is needed on how to facilitate access to climate finance in conflict-prone countries and regions. In addition, it is important to ensure that funding for peacebuilding, development and climate change adaptation is organised along the lines of principles of the Paris Declaration.

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