Towards Methodological Pluralism: An Empirical Evaluation of Research Methods for Assessing the Link between Climate Change and Violent Conflict

Dissertation

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Eidesstattliche Versicherung/Declaration on oath

Hiermit erkläre ich an Eides statt, dass ich die vorliegende Dissertationsschrift selbst verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe.

I hereby declare, on oath, that I have written the present dissertation by my own and have not used other than the acknowledged resources and aids.

Hamburg, den 17.11.2014

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Abstract

An intensive debate on the possible implications of climate change for peace and conflict has been taking place in the scholarly and political community for several years. It is widely accepted that a possible link between climate change and violent conflict is strongly dependent on social, political and economic context factors (or scope conditions), while an influence of climate change on inter-state violent conflict is regarded as unlikely. But beyond this, there is little consensus in the research field of climate change and violent conflict. This dissertation advances the debate on a potential climate-conflict nexus within states (or in spaces characterized by limited statehood) by focusing on the scarcity of renewable, natural resources and the associated socio-environmental conflict and cooperation dynamics. More specifically, this dissertation aims to make a twofold contribution.

Firstly, there are so far only very few reflections on the methods used to investigate possible links between climate change and violent conflict. Quantitative, large-N regression analysis is the dominant method in the research field, while qualitative, single case studies are also widely used. Both methods can be (and have been) used to generate valuable insights, but also suffer from serious shortcomings, especially when investigating the possible links between climate change and violent conflict. Therefore, the three methods Geographic Information System (GIS)-based risk analysis, Qualitative Comparative Analysis (QCA) and discourse analysis are introduced and empirically applied to analyze the links between climate change, resource scarcity, conflict, violence and cooperation. All three methods are well-established in geography and peace and conflict studies and seem promising for investigating a potential climate-conflict nexus, but have hardly or not at all been used in the research field so far. After empirically applying these methods, they are compared to each other as well as to the widely used methods of regression analysis and case study. By doing so, this dissertation aims at evaluating the suitability as well as the specific advantadges and deficits of the different methods in the research on climate change and violent conflict

Secondly, whilst empirically applying all three methods in various contexts, this dissertation also aims to make a substantive contribution to the research on climate change and violent conflict with a particular focus on three partially overlapping questions: a) How can one conceptualize and explain the transition from non-violent to violent socio-environmental conflicts, but also to cooperation? b) Which context factors raise (or reduce) the risk that climate change-induced stress in natural and social systems stimulates violent conflict? c) How can non-material factors – such as perceptions, identities, narratives or discourses – be included in the research on climate change and violent conflict and what is the analytical value added by them?

In order to achieve these methodological and substantial aims, three empirical studies are conducted.

The first study draws on the recent literature and datasets on climate change, vulnerability to climate change and violent conflict onset. It integrates various concepts and datasets by using ArcGIS in order to assess the spatial distribution of risk factors for climate change and violent conflict in Kenya and Uganda in 2008 with a resolution of 0.5°. A quantitative comparison with geo-referenced conflict data provides support for the resulting risk index. Three qualitative case studies, in contrast, provide mixed support for the risk index and help to identify its strengths and weaknesses. Overall, the empirical results support the hypothesis that context factors, and especially the indicators for vulnerability and general risk for violent conflict onset, are extremely important in mediating a possible link between climate change and violent conflict. Methodologically, GIS-based risk analysis suffers from the same data problems as other quantitative methods in the research on climate change and violent conflict, but supports the identification of data deficits and the design of systematic (comparative) case studies.

The second study compares twenty cases of intergroup conflict over scarce, renewable resources in peripheral areas of the global South. A fuzzy-set Qualitative Comparative Analysis (fsQCA) is used to determine the conditions under which such conflicts turn violent or remain non-violent. The main finding is that the simultaneous presence of negative othering, low power differences between the conflict parties and recent political change is robustly linked to the violent escalation of conflicts over scarce, renewable resources. The external appropriation of resources and large power differences, by contrast, are not linked to the use of violence in such conflicts. The application of the method of QCA enables researchers to take a middle ground between single case and large-N studies and to account for complex causal relationships characterized by, among others, equifinality and conjunctural causation.

The third study focuses on Israeli-Palestinian water interactions and consists of two parts. In the first part, a positivist-rationalist bias is identified in the research on socio-environmental conflicts and on climate change and violent conflict. In order to address this bias, an analytical framework is developed which allows for the systematic consideration of inter-subjective factors in the research on socio-environmental conflicts. In line with Keller's Sociology of Knowledge Approach to Discourse (SKAD), the framework understands reality as discursively constructed and highlights the relevance of identities and situation assessments when analyzing the links between environmental change, resource scarcity and conflict. When applied to the Israeli-Palestinian conflict about water resources, the developed discourse-theoretic framework is able to explain the existence of the water conflict and why it has not (yet) turned violent.

In the second part of the third study, the discursive framework is extended beyond the realm of socio-environmental conflict in order to analyze water-related cooperation between Israeli and Palestinian communities under the Good Water Neighbours (GWN) project. This cooperation takes place in very similar political, economic, historical, geographic and ecological contexts to the national-level water conflict and widespread non-cooperation regarding water between other Israeli and Palestinian communities. Existing theories of socio-environmental conflict and cooperation have problems explaining this simultaneity of conflictive and cooperative relationships. Based on 38 interviews with 44 GWN activists, the dominant GWN discourse therefore is analyzed and compared to the respective dominant national water discourses. The most important finding is that several elements of the GWN discourse are much more cooperation-prone than the dominant discourses in Israel and Palestine. Altogether, both parts of the third study highlight the relevance of non-material factors in the research on climate change and violent conflict and the suitability of discourse analysis to account for them in an empirical analysis.

When synthesizing the insights gained from an extensive review of the literature and the three empirical studies, I arrive at two main conclusions.

Firstly, all three methods which are empirically applied in this dissertation are, if appropriately used, highly suitable for studying the possible links between climate change and violent conflict. Although their shortcomings have to be acknowledged, GIS-based risk analysis, QCA and discourse analysis complement the currently most widely used methods of case study and regression analysis in several respects. Since each method has its specific advantages and limitations, multi-method designs are recommended for future research in order to use the potential of the various methods to complement each other. The choice of the method mix has to be guided by the concrete research question, the (potential) complementarities between the methods and the characteristics of the research field climate change and violent conflict.

Secondly, there is some evidence for the existence of a link between climate change and violent conflict, although the discussion is still far from settled. More importantly, the manifestation of a link between climate change and violent conflict is strongly dependent on a number of context factors, especially on the power differences between the relevant social groups, recent political changes and the level of past political instability. Non-material factors, and particularly identities and situation assessments as reproduced by discourses, are also crucial for understanding the link between climate change and violent conflict. Finally, the factors contributing to conflict onset under conditions of environmental stress and climate change are not identical to those facilitating a violent escalation of such conflicts.

Zusammenfassung

Wissenschaftler und politische Entscheidungsträger haben sich in den vergangenen Jahren intensiv mit den möglichen Auswirkungen des Klimawandels auf Frieden und Konflikte beschäftigt. Mittlerweile ist weitgehend akzeptiert, dass ein möglicher Zusammenhang zwischen Klimawandel und gewaltsamen Konflikten wesentlich von sozialen, politischen und ökonomischen Kontextfaktoren (oder Rahmenbedingungen) beeinflusst ist. Auch gilt die Beeinflussung zwischenstaatlicher Gewaltkonflikte durch den Klimawandel als unwahrscheinlich. Darüber hinaus existieren jedoch kaum konsensuale Positionen im Forschungsfeld Klimawandel und Gewaltkonflikte. Diese Dissertation leistet einen Beitrag zur Debatte um einen möglichen Klimawandel-Konflikt-Nexus innerhalb von Staaten (oder in Räumen begrenzter Staatlichkeit), indem sie sich auf die Knappheit erneuerbarer natürlicher Ressourcen und die damit in Verbindung stehenden Dynamiken sozial-ökologischer Konflikte und Kooperationen fokussiert. Dabei leistet die vorliegende Dissertation einen zweifachen Beitrag zur aktuellen Forschung.

Erstens existieren bislang kaum systematische Reflektionen über die Methoden, welche zur Erforschung eines potentiellen Zusammenhangs von Klimawandel und Gewaltkonflikten verwendet werden. Die quantitative, eine große Zahl von Fällen betrachtende Regressionsanalyse ist die dominante Methode im Forschungsfeld, aber auch qualitative Einzelfallstudien sind weit verbreitet. Beide Methoden können, wie existierende Studien zeigen, zur Generationen wesentlicher Erkenntnisse genutzt werden. Sie weisen jedoch ernst zu nehmende Defizite auf, vor allem was die Erforschung eines potentiellen Zusammenhangs von Klimawandel und Gewaltkonflikten angeht. Daher werden die drei Methoden der auf geographischen Informationssystemen (GIS) basierenden Risikoanalyse, der qualitativen vergleichenden Analyse (QCA) und der Diskursanalyse eingeführt und empirisch zur Untersuchung des Zusammenhangs von Klimawandel, Ressourcenknappheit, Konflikt, Gewalt und Kooperation genutzt. Alle drei Methoden zählen zum festen Inventar der Geographie bzw. der Friedens- und Konfliktforschung und sind mit Blick auf die Analyse eines potentiellen Klimawandel-Konflikt-Nexus vielversprechend. Sie wurden in diesem Forschungsfeld bislang jedoch noch kaum oder gar nicht angewandt. Nach der empirischen Anwendung aller drei Methoden werden diese miteinander sowie mit den weit verbreiteten Methoden der Regressionsanalyse und Fallstudie verglichen. Dadurch zielt die vorliegende Dissertation darauf ab, die Eignung der verschiedenen Methoden sowie ihre spezifischen Vorteile und Defizite in der Forschung zum Verhältnis von Klimawandel und Gewaltkonflikten zu evaluieren.

Da die vorliegende Dissertation die drei benannten Methoden empirisch anwendet, zielt sie zweitens darauf ab, einen inhaltlichen Beitrag zur Forschung im Themenfeld Klimawandel und

Gewaltkonflikte zu leisten. Ein besonderer Fokus liegt dabei auf drei sich partiell überlappenden Fragestellungen: a) Wie kann der Übergang von nicht-gewaltsamen zu gewaltsamen sozial-ökologischen Konflikte, aber auch zu Kooperation, konzeptionalisiert und erklärt werden? b) Welche Kontextfaktoren erhöhen (oder reduzieren) das Risiko, dass klimawandelinduzierter Stress in natürlichen und sozialen Systemen den Ausbruch gewaltsamer Konflikte begünstigt? c) Wie können nichtmaterielle Faktoren - beispielweise Wahrnehmungen, Identitäten, Narrative oder Diskurse - in die Forschung zu Klimawandel und Gewaltkonflikten einbezogen werden und welcher analytische Mehrwert geht mit ihnen einher?

Um diese methodologischen und inhaltlichen Ziele zu erreichen werden drei empirische Studien durchgeführt.

Die erste Studie verwendet aktuelle Literatur und Datensätze zum Klimawandel, zur Vulnerabilität gegenüber dem Klimawandel und zum Ausbruch gewaltsamer Konflikte. Verschiedene Konzepte und Datensätze werden mit Hilfe von ArcGIS integriert, um die räumliche Verteilung der Risikofaktoren für Klimawandel und Gewaltkonflikte in Kenia und Uganda im Jahr 2008 mit einer Auflösung von 0,5° zu analysieren. Der resultierende Risikoindex schneidet bei einem quantitativen Vergleich mit georeferenzierten Konfliktdaten gut ab. Ein Abgleich mit drei qualitativen Fallstudien hingegen führt zu gemischten Resultaten und unterstützt die Identifikation von Stärken und Schwächen des Risikoindexes. Insgesamt untermauern die empirischen Ergebnisse die These, dass Kontextfaktoren, und insbesondere die verwendeten Verwundbarkeits- und Gewaltkonfliktrisiko-Indikatoren, ganz wesentlich für das (Nicht-)Auftreten eines möglichen Zusammenhangs von Klimawandel und Gewaltkonflikten sind. In methodologischer Hinsicht weisen GIS-basierte Risikoanalysen die gleichen Datendefizite wie andere quantitative Methoden zur Erforschung des Verhältnisses von Klimawandel und Gewaltkonflikten auf. Sie unterstützen jedoch die Identifikation von Datenproblemen und die Generation systematischer Forschungsdesigns für (komparative) Fallstudien.

In der zweiten Studie werden zwanzig Fälle von Konflikten zwischen sozialen Gruppen um knappe, erneuerbare Ressourcen in peripheren Gebieten des globalen Südens miteinander verglichen. Mit Hilfe einer *fuzzy-set* qualitativen vergleichenden Analyse (fsQCA) werden die Bedingungen analysiert, unter denen solche Konflikte gewaltsam eskalieren oder gewaltfrei ausgetragen werden. Zentrales Ergebnis dieser Analyse ist, dass das gleichzeitige Vorliegen von negativem *othering*, geringen Machtunterschieden zwischen den Konfliktparteien und kurz zurückliegendem politischen Wandel eine quasi-hinreichende Bedingung für die gewaltsame Eskalation von Konflikten um knappe, natürliche Ressourcen ist. Hingegen besteht kein Zusammenhang zwischen der externen Aneignung von Ressourcen bzw. großen

Machtunterschieden zwischen den Parteien und der Anwendung von Gewalt in solchen Konflikten. QCA als Methode ermöglicht es Forschenden, einen Mittelweg zwischen Einzel- und Vielfallstudien einzuschlagen und komplexe kausale Beziehungen, wie etwa Äquifinalität und multiple kausale Interaktion, zu erfassen.

Die dritte Studie beschäftigt sich mit wasserbezogenen Interaktionen zwischen Israel und Palästina und besteht aus zwei Teilen. Im ersten Teil wird ein positivistisch-rationalistischer Bias in der Forschung zu sozial-ökologischen Konflikten und zu Klimawandel und Gewaltkonflikten identifiziert. Anschließend wird ein analytischer Rahmen zur Überwindung dieses Bias vorgeschlagen, der die systematische Berücksichtigung intersubjektiver Faktoren in der Forschung zu sozial-ökologischen Konflikten ermöglicht. Dieser Analyserahmen begreift im Einklang mit Kellers wissenssoziologischer Diskurstheorie Realität als diskursiv konstruiert und hebt die Relevanz von Identitäten und Situationseinschätzungen für die Analyse des Verhältnisses von Umweltwandel, Ressourcenknappheit und Konflikt hervor. Angewendet auf den israelisch-palästinensischen Wasserkonflikt kann der Analyserahmen sowohl die Existenz des Wasserkonflikts als auch dessen (bislang) gewaltfreien Austrag erklären.

Im zweiten Teil der dritten Studie wird der entwickelte diskurstheoretische Rahmen erweitert, um wasserbezogene Kooperation zwischen israelischen und palästinensischen Gemeinden unter dem „Good Water Neighbours" (GWN) Projekt analysieren zu können. Diese Kooperation findet unter sehr ähnlichen politischen, ökonomischen, historischen, geographischen und ökologischen Umständen statt wie der Wasserkonflikt auf der nationalen Ebene oder die weit verbreitete Nicht-Kooperation zwischen israelischen und palästinensischen Gemeinden. Bestehende Theorien sozial-ökologischer Konflikte und Kooperationen können diese Simultanität konfliktiver und kooperativer Beziehungen nur schwer erklären. Daher wird, basierend auf 38 Interviews mit 44 GWN-Aktivisten, der GWN-Diskurs analysiert und mit den jeweils dominanten nationalen Wasserdiskursen verglichen. Das relevanteste Ergebnis in diesem Zusammenhang ist, dass diverse Elemente des GWN-Diskurses eine deutlich höhere Offenheit gegenüber kooperativen Interaktionen aufweisen als die dominanten nationalen Wasserdiskurse. Insgesamt verdeutlichen beide Teile der dritten Studie die Relevanz nichtmaterieller Faktoren in der Forschung zu Klimawandel und Gewaltkonflikten sowie die Eignung der Diskursanalyse, diese nichtmateriellen Faktoren in empirischen Untersuchungen zu erfassen.

Aus den Ergebnissen der drei Studien und eines umfassendes Literaturberichts lassen sich zwei zentrale Schlussfolgerungen ziehen:

Erstens, alle drei in dieser Dissertation empirisch verwendeten Methoden sind, wenn sie adäquat angewendet werden, für die Erforschung eines potentiellen Zusammenhangs von Klimawandel und Gewaltkonflikten geeignet. GIS-basierte Risikoanalyse, QCA und Diskursanalyse sind zwar

nicht frei von Problemen, ergänzen aber die momentan weit verbreiteten Methoden der Fallstudie und der Regressionsanalyse in mehrfacher Hinsicht. Da jede Methode spezifische Vorteile und Limitationen aufweist, sollten in zukünftigen Forschungsprojekten multiple Methoden kombiniert werden, um deren Potential zur wechselseitigen Ergänzung zu realisieren. Die Auswahl des Methodenmixes sollte sich dabei an der konkreten Forschungsfrage, den Potentialen zur wechselseitigen Ergänzung der Methoden und den Charakteristika des Forschungsfeldes Klimawandel und Gewaltkonflikte orientieren.

Zweitens existieren einige Hinweise für die Existenz eines Zusammenhangs von Klimawandel und Gewaltkonflikten. Eine definitive Aussage bezüglich dieser Thematik kann jedoch nicht getroffen werden. Deutlich relevanter ist, dass der Zusammenhang von Klimawandel und Gewaltkonflikten ganz wesentlich von einer Reihe von Kontextfaktoren geprägt wird. Insbesondere Machtdifferenzen zwischen sozialen Gruppen, kurz zurückliegender politischer Wandel und frühere politische Instabilität sind in diesem Kontext relevant. Nichtmaterielle Faktoren, und insbesondere diskursiv konstruierte Identitäten und Situationseinschätzungen, sind ebenfalls zentral für das Verständnis des Zusammenhangs von Klimawandel und Gewaltkonflikten. Zudem sind jene Faktoren, die zum Ausbruch von Konflikten unter Bedingungen von ökologischem Stress und Klimawandel führen, nicht identisch mit jenen Faktoren, die eine gewaltsame Eskalation solcher Konflikte begünstigen.

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Teile dieser Dissertation basieren auf Arbeitspapieren und Artikeln, die ich gemeinsam mit anderen Wissenschaftlern verfasst habe.[1] Christiane Fröhlich, Grace Ngaruyia, Janpeter Schilling, Jasmin Link, Jürgen Scheffran, Michael Link und Thomas Weinzierl erwiesen sich als produktive Ko-Autoren, deren Beiträge und Anmerkungen die jeweiligen Papiere enorm verbessert haben. Cosima Schröer, Han Tran, Leonard Borchert, Pina von Prondzinski, Sabrina Wannewitz und Thomas Weinzierl haben mich als studentische Hilfskräfte von diversen Aufgaben der Formatierung, Datenrecherche und -verarbeitung entlastet. Ihre Arbeiten waren stets von hoher Qualität und haben mir wertvolle zeitliche Freiräume geschaffen.

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Die in den Kapitel 5 und insbesondere 6 vorgestellte Feldforschung wäre ohne eine große Zahl an Unterstützern so nicht möglich gewesen. An erster Stelle sind hier die Mitarbeiter und Aktivisten von Good Water Neighbours zu nennen, die mich herzlich empfangen und sich Zeit

[1] Deatillierte Informationen hierzu finden sich in den Fußnoten am Anfang der jeweiligen Kapitel.

für die Interviews genommen haben. Häufig haben sie mir auch weitere Kontakte, Verpflegung oder Mitfahrgelegenheiten zur Verfügung gestellt und standen für gute, über das Inhaltliche hinausgehende Gespräche zur Verfügung. Abdallah Taha, Amina Nolte und Joachim Langner haben mir zahlreiche Hinweise für die Organisation der Forschungsreise gegeben und mich mit Übersetzungen ins Arabische bzw. Hebräische unterstützt.

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und sportliche Aktivitäten sowie die alljährliche weihnachtliche Zusammenkunft seien hier nur beispielhaft erwähnt. Meine größte Stütze in den vergangenen drei Jahren waren jedoch meine Frau Davina und mein Sohn Immanuel. Ohne sie wäre nichts so schön, wie es ist. Ihnen ist die vorliegende Arbeit daher gewidmet.

List of abbreviations

°	decimal degree
%	percent
ACLED	Armed Conflict Location and Event Data Project
av.	average
CEWARN	Conflict Early Warning and Response Mechanism
CIA	Central Intelligence Agency
CO_2	carbon dioxide
CRI	Composite Risk Index
DHS	Demographic and Health Survey
FAO	Food and Agriculture Organization of the United Nations
FEWS NET	Famine Early Warning Systems Network
FoEME	Friends of the Earth Middle East
fsQCA	fuzzy-set Qualitative Comparative Analysis
GCP	gross cell product
GDELT	Global Data on Events, Location and Tone
GDP	gross domestic product
GED	Georeferenced Event Dataset
GIS	Geographic Information System
GLASOD	Global Assessment of Human-induced Soil Degradation
GWN	Good Water Neighbours
INUS	insufficient, but necessary part of an unnecessary but sufficient condition
IPCC	Intergovernmental Panel on Climate Change
ISRIC	International Soil Reference and Information Centre
IWA	Israel Water Authority
IWMI	International Water Management Institute
JWC	Joint Water Committee
km^2	square kilometer
KOD	Kenya Open Data
MCM	million cubic metre
N	number of cases
NGO	non-governmental organization
OECD	Organisation for Economic Co-operation and Development
PLO	Palestine Liberation Organization
PNA	Palestine National Authority
PNAS	Proceedings of the National Academy of Sciences
PRIO	Peace Research Institute Oslo
PWA	Palestinian Water Authority
QCA	Qualitative Comparative Analysis
SCAD	Social Conflict in Africa Database
SKAD	Sociology of Knowledge Approach to Discourse
SLDF	Sabaot Land Defence Force
u5	under five
UBOS	Uganda Bureau of Statistics
UCDP	Uppsala Conflict Data Program
UN	United Nations
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USA	United States of America
WBGU	German Advisory Council on Global Change
WHO	World Health Organization
xconst	executive constraints

List of figures and tables

1 Introduction

With precursors in the 1970s and 1980s (Brown 1977; Durham 1979; Ophuls 1976; Ullman 1983), the relationship between environmental change, resource scarcity and violent conflict has ranked high on the agenda of political geography and peace and conflict studies since the early 1990s (e.g. Bächler et al. 1996; Deudney 1990; Gleick 1993; Homer-Dixon 1991, 1994; Kaplan 1994; Levy 1995; Starr 1991).[2] With the publication of the fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) in 2007, the debate simultaneously received renewed attention and was reframed in terms of climate change and conflict (e.g. Barnett/Adger 2007; Buhaug 2010; Burke et al. 2009; Dyer 2011; Engels/Chojnacki 2012; Nordås/Gleditsch 2007; Nyong 2007; Salehyan 2008; Scheffran 2009; WBGU 2008). Since then, a number of high ranking policy makers and forums, including Barak Obama, Ban Ki Moon, John Kerry, the UN Security Council and the Nobel Peace Price Committee, have expressed their concerns about the negative impacts of climate change on peace and societal stability (see Brauch 2009; McDonald 2013). And violent conflicts which are assumed to be related to climate change are reported from countries as diverse as Nigeria (Nyong 2007), Kenya (Njiru 2012), Ethiopia (Temesgen 2010), Sudan (Faris 2007), Bangladesh (Saha 2012), Egypt (Johnstone/Mazo 2011) and Syria (Gleick 2014).

There are indeed few doubts about the net negative effects of climate change on ecological and social systems in many parts of the world (World Bank 2013b). According to the recent report of the IPCC (2013, 2014), climate change is a driver of more extreme heat events, reduced and/or more volatile precipitation, glacier melting and a rising sea level. These changes are in turn likely to cause more (intense) floodings, biodiversity loss, reduced freshwater availability, food insecurity, more frequent and intense storms and landslides, lower economic growth, poverty, non-voluntary migration and increased stress for human health. However, the concrete temperature and precipitation trends differ tremendously between the various regions and sub-regions of the world, and their impacts are strongly dependent on the characteristics of local socio-environmental system as well as on the mitigation and adaptation measures conducted (Adger 2006; Adger et al. 2013; Gioli et al. 2013a; Leichenko/O'Brien 2008; Ngaruiya 2014).

But is it possible that, if unrelieved, the already visible and the predicted consequences of climate change are causing an increasing number of violent conflicts? When assessing the state of the art in climate change research, the IPCC (2014: 17)[3] concludes:

[2] See Dalby et al. (2009) and Rønnfeldt (1997) for historical overviews.

[3] Note, however, that various chapters of the IPCC report arrive at different and at times inconsistent conclusions on the links between climate change and violent conflict (Gleditsch/Nordås 2014).

> "In summary, there is justifiable common concern that climate change or changes in climate variability increases the risk of armed conflict *under certain circumstances* […] *Confident statements* about the effects of future changes in climate or armed conflict *are not possible* given the absence of generally supported theories and evidence about causality." (emphasis added)

This statement illustrates two important points in the research on climate change and violent conflict. Firstly, climate change can only increase the risk of violent conflict onset in contexts where the capacity to cope with the adverse impacts of climate change is low and the risk for violent conflict is already high. This concurs with the widely used metaphor of climate change as a "threat multiplier" (e.g. Buhaug/Theisen 2012: 51; Johnstone/Mazo 2011: 11; Njiru 2012: 520). If there are no pre-existing conditions favorable to violent conflict onset (i.e. factors which climate change can multiply), then the implications of climate change for societal stability and violent conflict are negligible. These conditions can include livelihood insecurity and poverty, power and wealth inequalities, existing social, cultural or political tensions, problematic socio-demographic trends, political instability as well as bad governance and weak state capabilities (Carius et al. 2006). Violent conflicts between states are also unlikely to be caused or triggered by climate change or environmental factors in general (chapter 2; Gleditsch 2012; Link et al. 2012; Wolf et al. 2003). Secondly, besides agreement on these points, there is currently no scientific consensus about the relationship between climate change and violent conflict (Bernauer et al. 2012; Scheffran et al. 2012c; Theisen et al. 2013).

This dissertation advances the debate on the possible link between climate change and violent conflict within states or in areas of limited/absent statehood.[4] However, it will not present any definitive conclusions on the issue. It would be misleading to claim that the scientific debate on such a wide and complex issue could be resolved by any kind of "silver bullet approach" rather than by continuous and painstaking efforts to study the links between climate change and violent conflict from a variety of disciplinary, theoretical, methodological and empirical perspectives.

1.1 Aims and research questions

Against this background, my study aims to make a twofold contribution to the debate on climate change and violent conflict, one of a methodological and one of a substantive nature.

1.1.2 Methodological aims

Besides quite specific debates around the correct specification of models and variables used in regression analysis (Buhaug 2010, 2014; Buhaug et al. 2014; Hsiang/Burke 2014; Hsiang/Meng 2013), there are so far only very few methodological reflections in the research on climate change

[4] If not otherwise stated, conflict from now on refers only to intra-state conflict or conflict in areas of limited/absent statehood.

and violent conflict. The two by far most often used methods are quantitative, large-N regressions analysis and qualitative, single case study (see chapter 2). The former is criticized for its strong dependence on datasets which suffer from availability and reliability problems and its inability to capture complex local realities (e.g. Chojnacki/Engels 2013; Detges 2014; Martin 2005; Selby/Hoffmann 2014). Single-case studies, if not properly designed, produce results which are only generalizable to a limited extent (Gleditsch/Urdal 2002; Koubi et al. 2014; Meierding 2013). Some calls have been launched to use mixed research designs combining both methods (e.g. Meierding 2013; Scheffran et al. 2012c; Solow 2013). But many of these suggestions clearly give priority to regression analysis. The imagined role for case-study research as the mere ancillary science for statistic-based analyses is best illustrated by Andrew R. Solow's (2013: 180) call for quantitative and qualitative scholars to intensify their cooperation in investigating possible climate-conflict links: "The goal of both should be to develop statistical models that better reflect the real drivers of civil conflict."

I agree that quantitative and qualitative methods should be more thoroughly integrated in the research on climate change and violent conflict. But when doing so, both methods should be acknowledged as equally valid (Brady et al. 2004; Mahoney/Goertz 2006) and complemented by medium-N research designs and theoretical studies. In addition, researchers have to be aware that "quals vs. quants debates" might mask important epistemological and ontological differences (or the absence of such differences), which can profoundly influence methodological choices and research results (Bryman 2012: 27-35; Wight 2013: 48).[5] Given the widespread lack of methodological debates in the research on climate change and violent conflict, these issues have not yet received sufficient attention. Limited methodological diversity has repeatedly been identified as a driver of incomplete or inconsistent empirical findings (Bennet 2004; Collier et al. 2010). The first aim of this dissertation is therefore to identify methods which are well-established in geography and/or political science and which seem promising for the research on climate change and violent conflict, but which have so far not been widely used in this research field. These methods are then going to be applied to investigate possible links between climate change and violent conflict, and finally, their potentials and pitfalls will be compared with each other as well as with the currently dominant methods of single-case study and large-N regression analysis.

Three methods seem promising for this field of study and have so far hardly or not at all been applied to the research on climate change and violent conflict, namely GIS-based risk analysis, Qualitative Comparative Analysis (QCA) and discourse analysis:

[5] Generally speaking, epistemology is concerned with the question what counts as knowledge and how it can be acquired by humans, while ontology is concerned with the nature of reality, and thus the things most crucial to analyze (or focus on) in a scientific endeavour (Bieling 2007: 27f.; Bryman 2012: 32f.; Wight 2013).

(1) *GIS-based risk analysis*: Geographic Information Systems (GIS) have been widely used in geography (e.g. Bednarz 2004; Elwood et al. 2012; Fotheringham/Rogerson 2002) and have recently also become popular in peace and conflict studies (Gleditsch/Weidmann 2012). They have been utilized to investigate the links between environmental change and violent conflict in a quantitative (e.g. Hendrix/Salehyan 2012; Raleigh/Kniveton 2012) and qualitative (Bocchi et al. 2006) manner. GIS-based risk analysis (also known as GIS-based risk assessment) is a subset of GIS applications which is specifically concerned with the spatial distribution of factors that shape the risk for the emergence of an outcome that is deemed undesirable. GIS-based risk analyses are widely used to assess the risk of social and socio-technological entities (e.g. urban conglomerates, water distribution systems) to environmental hazards such as floods, fires or water contamination (Fedeski/Gwilliam 2007; Vairavamoorthy et al. 2007; Zhijun et al. 2009). They have also been applied in peace and conflict research (Rustad et al. 2011). But with the partial exception of Busby et al.'s (2013) work on the risks climate-related disasters pose to human security, GIS-based risk analysis has not yet been used to analyze the spatial distribution of risks factor for climate change and violent conflict (see also de Sherbinin 2014).

This is surprising for two reasons. Firstly, our knowledge about the conditions under which a climate-violence link is most likely to be found has considerably improved in recent years (e.g. Fjelde/von Uexkull 2012; WBGU 2008), and more and more high resolution data on the issue have become available (e.g. Raleigh et al. 2010; Tollefsen et al. 2012). Secondly, GIS-based risk analysis, while itself quantitative in nature, can serve as a bridge between quantitative and qualitative methods. It can assist case-study researchers in creating systematic most likely, most unlikely, most different systems or most similar systems research designs. This would increase the generalizability of qualitative research as well as its capability to detect relevant causal links and intervening variables (Bocchi et al. 2006; Flyvbjerg 2006; Gerring 2007). And the comparison of the results of a GIS-based risk analysis with more fine-grained and context-sensitive qualitative data enables the "ground checking" of the datasets (and to a limited extend also theories) on which regression analyses rely (Gleditsch/Weidmann 2012).

In short: GIS-based risk analysis has a high potential to facilitate the dialogue between quantitative regression analyses and qualitative case studies, a dialogue strongly needed in the research on climate change and violent conflict (Gemenne et al. 2014; Scheffran et al. 2012c). Other advantages of GIS-based risk analyses include their high communicatability due to the visualization of the results in the form of maps, the possibility to integrate data

from various sources with different spatial precision, and their flexibility since the analyses can be re-run once new theoretical knowledge or more fine-grained data become available.

(2) *Qualitative Comparative Analysis (QCA)*: QCA has been developed to identify complex causal pathways for a medium number of cases (Berg-Schlosser et al. 2009; Ragin 1987) and has gained increasing prominence in the social sciences in recent years (Rihoux/Marx 2013). It is especially suitable for use in accounting for complex causal patterns such as equifinality and conjunctural causation (see chapter 4 and Schneider/Wagemann 2012: 78). QCA thus resonates very well with recent studies on climate change and violent conflict, which highlight the importance of indirect causation and interaction effects (Fjelde/von Uexkull 2012; Koubi et al. 2012; Salehyan/Hendrix 2014; Scheffran et al. 2014). In addition, researchers can combine in-depth knowledge (consisting of qualitative and quantitative data) of particular cases with a high generalizability when using QCA (Berg-Schlosser/de Meur 2009; Schneider/Wagemann 2012). QCA, although it is mainly a qualitative method since it focuses on the causes-of-effects (see below), thus represents a clearly needed methodological middle ground between qualitative single-case and quantitative large-N studies (Vis 2012).

Recently, Bretthauer (2014) successfully used a QCA to investigate the conditions under which resource scarcity facilitates the occurrence of civil war. But her analysis is entirely depended on quantitative indicators with a very low spatial resolution (country-level) and thus does not fully realize the potential of QCA to combine elements of quantitative and qualitative methods in the research on climate change and violent conflict. This is especially the case since many cases studies on environmental change and (violent) conflict already exist (e.g. Bächler/Spillmann 1996; Carius et al. 2006; Derman et al. 2007; Homer-Dixon/Blitt 1998c; Lind/Sturman 2002; Mwiturubani/van Wyk 2010), which can be compared with each other in order to detect common (and presumably complex) causal patterns. The potential to compare this large number of qualitative case studies, and the associated potential to achieve integrated cumulation of knowledge (see chapter 2 and Zinnes 1976), so far lies idle in the research on climate change and violence conflict

(3) *Discourse analysis*: A discourse is commonly defined as "a specific ensemble of ideas, concepts, and categorizations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities" (Hajer 1995: 44). Discourse analytical approaches are frequently used in peace and conflict research in order to untangle which inter-subjectively constructed ensembles of ideas, concepts and categories drive (non-)violent conflict actions (e.g. Braun 2011;

Campbell 2005; Dunn 2001; Hansen 2006). As Kaufman (2001: 212) puts it: "The main thing we need to find out [in order to understand violent conflict] is what people are saying about each other." However, discourses analytic approaches are also widely used in environmental policy analysis (Hajer/Versteeg 2005) and human geography (Glasze/Mattissek 2009), among others.

Several studies have investigated science and policy discourses on climate change and conflict/security on the international level or in the global North (Brzoska 2009; Detraz/Betsill 2009; McDonald 2013; Oels 2012; Trombetta 2008). But there are few studies available which draw on discourse analysis (Fröhlich 2012) or other constructivist approaches (Martin 2005; Vandergeest 2003) to analyze potential links between environmental change and conflict on the local level, and none of these connect their theoretical premises and empirical findings systematically to the literature on climate change and violent conflict. This is unfortunate since discourse analysis and the related theoretic approaches enable researchers to understand how social groups perceive their environments and other groups and what kind of actions result from these (discursively constructed) perceptions (Keller 2011a). Discourse analysis as a method is therefore in line with the many studies which highlight that neither perceptions of environmental changes nor group identities are uncontested between different groups or "objectively" accessible features of reality (e.g. Chatterjee 2012; Morozov/Rumelili 2012; Murtinho et al. 2013; Rettberg 2010).

By contrast, many quantitative and qualitative studies on the possible links between climate change and violent conflict are based on a positivist[6] epistemology and a rationalist-objectivist ontology (see chapter 5 and also Fröhlich 2012; Selby/Hoffmann 2014). That is, they conceptualize individuals and social groups as utility maximizers which act in a rational manner towards bio-physical and socio-economic surroundings which they can perceive in a largely objective manner. Discourse analysis challenges these epistemological and ontological assumptions and thus helps to correct the corresponding positivist-rationalist bias (chapter 5). By doing so, it allows for the use of recent insights from political ecology (e.g. Wittayapak 2008), identity theory (e.g. Abdelal et al. 2006), constructivist conflict research (e.g. Kaufman 2009), environmental sociology (e.g.

[6] There are intensive debates on the definition and core propositions of positivism, and especially peace and conflict scholars have been accused to use the term in an inconsistent and inadequate way (Nicholson 2000; Wight 2013). In this thesis, the term positivism refers to the position (a) that humans (and especially scientist) can perceive the world in an objective way, (b) that only observable appearances should be studied to gain scientific knowledge (phenomenalism), and (c) that the methods used in the natural sciences are also suitable to generate knowledge in the social sciences (Bryman 2012: 27f.; Wight 2013).

Burningham et al. 2008), and integrative geography (e.g. Murtinho et al. 2013) in the research on climate change and violent conflict.

More extensive discussions about the methods, their operationalization, their (potential) contribution to the research on climate change and violent conflict, and their relevance for this dissertation are provided in chapter 3-6 and in the conclusion. Finally, it should be mentioned that there are other methods which have the potential to make important contributions to the research on climate change and violent conflict. But time and space constraints as well as my ambition to apply the methods to concrete theoretical questions and in empirical settings preclude a discussion of more than three methods in addition to (already well-established) regression analysis and case study. Recent efforts to introduce agent-based modeling (Butler/Gates 2012; Devitt/Tol 2012; Yang et al. 2014) and field experiments (Prediger et al. 2014) deserve further attention in particular. However, there were good reasons not to include any of these two methods in the dissertation. Modeling depends on adequate datasets and good theoretical knowledge on the pathways connecting climate change to violent conflict, both of which remain to be established (chapter 2). Field experiments are very labor-consuming, but suffer from low levels of generalizability and ecological validity (Bryman 2012: 50-58).

1.1.3 Substantive aims

All three methods described above are not just discussed in theoretical terms, but applied in the context of empirical studies. Therefore, the second aim of this dissertation is to provide new substantive or empirical evidence on the potential links between climate change and violent conflict. A particular focus is directed to three issues:

(1) *Relationship between conflict and violence*: It has repeatedly been emphasized that scholars can explain how environmental stress and climatic changes add to social tensions, but that the respective literature has undertaken few efforts to explain how and why such tensions escalate into violence (Barnett 2000; Engels/Chojnacki 2012). The relationship between climate change, conflict and violence will thus be a crucial crosscutting issue of this dissertation. However, the binary distinction between non-violent and violent conflict cannot cover the whole range of interactions and relations between social groups (Goldstein 1992). Cooperation and positive peace remain as further options. Indeed, an emerging literature on environmental peacebuilding (Barquet et al. 2014; Conca/Dabelko 2002b) and disaster diplomacy (Kelman 2012; Streich/Mislan 2014) highlights the potential of adverse environmental changes to improve intergroup relations. Accordingly, Gemenne et al. (2014: 6) suggest in a recent review of the literature on climate change and security that „more emphasis needs to be put on the factors for peace and cooperation".

Therefore, I will also consider the transition from conflict to cooperation under environmental stress (particularly in chapter 6).

(2) *Context factors*: Is has been mentioned above that climate change can act as an underlying cause or trigger of violent conflict only under certain conditions. However, research has so far at best produced laundry lists of these conditions or context factors (Buhaug et al. 2010; Carius et al. 2006; Scheffran et al. 2012c), and many issues regarding the interaction between and the operationalization of these factors remain underinvestigated. Single-case studies highlight the relevance of particular combinations of context factors, but have so far not agreed on a set of conditions that is relevant beyond specific conflicts (de Châtel 2014; Nyong 2007; Schilling et al. 2012; Selby/Hoffmann 2014). Large-N studies have started to pay attention to interactions effects (Fjelde/von Uexkull 2012; Theisen et al. 2012), but their ability to account for such effects is limited due the low number of interaction terms which can be used in a regression analysis (Vis 2012). Thus, the context in which climate change-induced social stress is most likely to stimulate violent conflict is a second major crosscutting theme of this dissertation.

(3) *Relevance of non-material factors*: Constructivist peace and conflict scholars, but also critical geographers, have long highlighted the relevance of non-material factors such as perceptions or identities for understanding the dynamics of intergroup conflicts (e.g. Campbell 2005; Chatterjee 2012; Cramer 2002; Jabri 1996; Kaufman 2001; Suzuki 2007). Likewise, it has convincingly been argued that environmental changes and their causes are not "objective facts", but the subject matter of processes of intersubjective construction and social contestation (e.g. Murtinho et al. 2013; Otto/Leibenath 2014; Swyngedouw 2004; Wittayapak 2008). Drawing on Keller (2013: 61), material factors can be understood as the world's "material quality [which] sets up obstacles before us and confronts us with problems of interpretation". However, these material factors - such as walls, arms, border checkpoints, rivers, temperature changes etc. – "can only be perceived or experienced through socially constructed identities, narratives or discourse" (Keller 2013: 61), which are termed non-material factors (see chapter 5 for a longer discussion of this issue).[7] As has been discussed in the section on discourse analysis above, most research on climate change and violent conflict is currently based on a positivist epistemology and a rationalist-objectivist ontology. Against this background, this dissertation will focus on non-material factors or, more precisely, on the non-material aspects of material factors, as a third cross-cutting issue.

[7] Please note here that according to Keller (2011b), discourses have a material quality, while in my view, discourses structure perceptions of material factors and human actions aiming at transforming or preserving the material world, but have no material quality on their own.

All three issues, their relevance for and their past and current status in the research on climate change and violent conflict are discussed in greater depth in chapters 2-6 and in the conclusion.

1.1.4 Research questions

In summary, the dissertation aims to answer two central research questions:

Q1: Which research methods, besides the currently most-widely used (positivist-rationalist) case study and regression analysis, have the potential to increase our knowledge about the relationship between climate change and violent conflict? What are their strengths and weaknesses when applied to this research field and when compared to each other and to the so far most-widely used methods?

Q2: Is climate change a cause or trigger of violent conflicts? If so, which context factors are particularly important, how can the transition from conflict to violence (or to cooperation) be explained, and how relevant are immaterial factors for the relationship between climate change and violent conflict?

In contrast to most other studies, I have decided to limit myself not to one particular country, region or location. There are several reasons for this. Firstly, QCA is a method designed to compare various cases, and the generalizability of the QCA findings would be low if all cases were picked from the same geographic background. Secondly, the regional foci of the respective empirical applications were chosen in order to maximize the insights which can be gained for the wider methodological debate in the research on climate change and violent conflict. For instance, the GIS-based risk analysis was conducted for Kenya and Uganda because many qualitative case studies on the links between climate change and violent conflict were available. These supported the specification of adequate parameters for the risk analysis and enabled a comparative "ground checking" of the datasets used and the results yielded. Similarly, the existence of a number of studies on the discursive dimensions of the Israeli-Palestinian water conflict facilitated the development a comprehensive discursive understanding of socio-environmental conflicts and its extension to Israeli-Palestinian water cooperation. Thirdly, conducting empirical research in various geographical, political, socio-economic and cultural contexts has enabled me to gain insights into the chances and limits of applying diverse methods within each of these particular contexts (see conclusion). Finally, the investigation of various, diverse cases increases the generalizability of the findings of the dissertation (Flyvbjerg 2006), especially regarding the suitability of the various methods and the relevance of context and non-material factors in the debate on climate change and violent conflict.

1.2 Central concepts and definitions

This dissertation is cumulative in nature.[8] This implies that core concepts are not necessarily used in a strictly unitary manner throughout the chapters, but sometimes were adapted after discussions with co-authors, journal editors and reviewers. However, the definitions of central terms are explicitly explained in each chapter and do not contradict each other, but only sometimes put stronger or weaker emphasis on certain characteristics of the concepts. If not stated otherwise, the following definitions are used:

When referring to conflicts, the focus is always on intergroup conflicts, which can be distinguished from interpersonal or intrapersonal conflicts (Bonacker/Imbusch 2010: 69). Following Baron (1990: 198) and Dietz/Engels (2014), such a conflict can be defined as a process in which at least two social groups perceive their respective interests as contradictory and undertake actions in order to enforce or articulate these interests. Conflicts are not necessarily negative. Rather, conflicts can be positivist catalysts of progressive social change (Dubiel 1999; Mouffe 2005). However, conflicts are considered socially dysfunctional if they turn violent. A conflict is considered violent if direct, physical force against human beings is used by at least one conflict party in order to enforce or articulate its interests (Bonacker/Imbusch 2010: 83-87). By contrast, cooperation exists "when one or more parties engage in jointly coordinated actions with other actors to secure shared" interests (Ravnborg et al. 2012: 349). Cooperation and conflict can exist in parallel (Zeitoun/Mirumachi 2008), for instance when villages in Yemen engage in conflict over scarce water resources but simultaneously cooperate to prevent the government from extracting groundwater in their region (Al-Shaybani/al-Zubayri 2005). Nevertheless, a relationship between two groups, which is constituted by a larger number of interactions, can be characterized as either overwhelmingly cooperative or overwhelmingly conflictive.

Climate is defined as the average pattern of meteorological variables, mostly temperature, precipitation and wind. "Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer)" (IPCC 2001). Throughout this dissertation, climate change is used to describe the warming trend of the global mean temperature - and its associated consequences for precipitation and wind patterns - that started in the middle of the 19th century and can be attributed to human-induced changes of atmospheric composition, and particularly to the emissions of CO_2 (IPCC 2013). Climate change and its impacts on socio-environmental systems have already become visible in the past decades, but will increase in magnitude in the future (IPCC 2013, 2014; World Bank 2013b).

[8] It is submitted as a monograph but consists out of five studies which have been in parts conducted together with other researchers and published in or submitted to peer-reviewed journals.

Climate change is predicted to cause, in interaction with other political, economic, cultural and ecological factors, increasing water and food scarcity, migration, and more intense/frequent natural disasters. These changes, in turn, are hypothesized to act as triggers for or causes of violent conflict (Buhaug et al. 2010; Scheffran/Battaglini 2011; WBGU 2008). If climate change is one (among several other) important element of a causal chain leading to violent conflict onset, this violent conflict is termed climate change-related or climate change-induced. However, most of the impacts of climate change will only become manifest in the future, and a single event (say, at drought or a hurricane) cannot be attributed to climate change (Rahmstorf/Schellnhuber 2007). Therefore, as most other studies, this dissertation uses past environmental changes, climate-related disasters and especially renewable resource scarcities as proxies to evaluate the relevance of climate change for violent conflicts. Such conflicts are often also termed environmental conflicts, but I prefer the term "socio-environmental conflicts" (Reboratti 2012: 3), since it is both social and environmental factors that drive their dynamics.

A research method or simply method is defined as a tool or procedure to collect and/or analyze data in a systematic manner (Bryman 2012: 46). Research design, by contrast, refers to "the plan, the structure and the strategy of investigation" and includes, next to the research method, a definition of the subject and/or area under investigation, the research questions, hypotheses, theories etc. (Burnham et al. 2004: 30). Research methods and designs are termed qualitative if they pursue a causes-of-effects approach, that is, if they aim to explain particular outcomes (effects). Quantitative research methods and designs, on the other hand, try to estimate the average effects of particular independent variables, and thus use an effects-of causes approach (Mahoney/Goertz 2006). Such classifications are subjects of fundamental controversies and often rather ideal typical than empirically clear cut (Beck 2010; Bryman 2012: 35-38; King et al. 1994; Mahoney/Goertz 2006). Nevertheless, it seems safe to classify regression analysis and GIS-based risk analysis as quantitative and QCA, discourse analysis and case study as qualitative methods. However, case study is usually not considered as a research method but as research design because it does not formulate specific requirements regarding data collection or analysis (Burnham et al. 2004: 53-55; Gerring 2007: 29-36).[9] In this dissertation, I will therefore reserve the term case study for those investigations which focus on one or very few cases and use process tracing (Checkel 2008) to uncover causal sequences which connect independent to dependent variables in order to explain the latter. In the research on climate change and violent conflict, most case studies are based on a positivist epistemology and a rationalist-objectivist ontology (see chapter 2 and 5).

[9] Case study research designs are in fact compatible with several research methods, such as process tracing, content analysis, focus group discussions, discourse analysis, questionnaires, semi-structured interviews etc.

1.3 Structure of the dissertation

This dissertation is structured as follows. In the next chapter, the literature on climate change and violent conflict is reviewed more thoroughly. Based on this review, several suggestions for integrative cumulation of knowledge in the research on climate change and violent conflict are formulated (chapter 2).

Afterwards, GIS-based risk analysis is introduced as a method and used to analyze the spatial distribution of risk factors for climate change and violent conflict in Kenya and Uganda. The results of the risk analysis are evaluated vis-à-vis qualitative and quantitative evidence. Based on this, I discuss how GIS-based risk analyses complement case studies and regression analyses in the research on climate change and violent conflict and facilitate dialogue between both methods (chapter 3).

In the following chapter, QCA is used to investigate the conditions under which conflicts around scarce renewable resources turn violent. Two key findings of this analysis are (a) that QCA as a middle ground between qualitative, in-depth case studies and quantitative, large-N regression analyses is well-suited for researching the potential links between climate change and violent conflict, and (b) that the simultaneous presence of negative othering, low power differences and recent political change are important conditions for the violent escalation of socio-environmental conflicts (chapter 4).

The relevance of negative othering highlighted by the QCA encourages me to address the relevance of non-material factors, and particularly of discourses, identities and situation assessments, more systematically. Based on the existing literature on these issues, I develop a discursive understanding of socio-environmental conflicts and show that the Israeli-Palestinian water conflict cannot be explained by drawing on material and seemingly "objective" factors alone. A focus on discourses, by contrast, enables deeper insights into the conflictive, but not violent water interactions between Israel and Palestine. A discursive understanding of socio-environmental conflicts also has the potential to constructively address the positivist-materialist bias which exists in the research on climate change and violent conflict and often gets lost in the "quants vs. quals" debate (chapter 5).

The theoretical framework and methodology developed is then utilized to empirically analyze the discourses which facilitate water-related cooperation between Israeli and Palestinian communities under the Good Water Neighbours (GWN) project. In doing so, I can explain the simultaneous presence of water conflict on the inter-national level and water cooperation on the inter-communal level under similar political, economic, historical, geographic and ecological circumstances. Methodologically, it is shown how discourse analysis can be used in combination

with semi-structured interviews in order to understand the occurrence of socio-environmental conflict and cooperation (chapter 6).

Finally, a conclusion is drawn which reflects the insights gained by this dissertation for the broader research on climate change, conflict, and violence. When doing so, I focus in particular on the two overarching research aims and questions of the dissertation as outlined in this introduction (chapter 7).

2 On climate, conflict and cumulation: suggestions for integrative cumulation of knowledge in the research on climate change and violent conflict[10]

2.1 Introduction

Climate change is estimated to raise the global mean temperature by between 1.0 and 3.7 degrees by the end of the 21st century, compared to the period 1986-2005 (IPCC 2013: 90). The negative consequences of this include, inter alia, changed precipitation patterns, melting glaciers, rising sea level, worsening conditions for agriculture and more frequent or intense natural disasters (World Bank 2013b). For several years, policy makers and scientists alike have been concerned with whether these consequences of climate change might stimulate more violent conflict (Brauch 2009). US Secretary of State John Kerry, for instance, warned: "If we don't respond adequately to the challenge of global climate change over the course of these next years there will be people fighting wars over water and over land" (U.S. Department of State 2013). But are such claims warranted? Various attempts have been made since the early 1990s to assess the links between environmental problems such as water scarcity or soil degradation and violent conflict (e.g. Bächler 1998; Homer-Dixon 1994). The arguments developed by this early research are quite similar to those circulating in the discussion about climate change and conflict, which developed rapidly from 2007 onwards (Meierding 2013). This is hardly surprising given the fact that climate change is one form of environmental change and that many environmental problems (e.g. scarcity of renewable resources) can be caused by climate change as well as by other factors (e.g. overuse, contamination, unequal distribution).

Previous research largely agrees that environmental problems and climatic changes are unlikely to provoke inter-state violent disputes (Gleditsch 2012). Indeed, there is only a rather thin record of violent environmental conflicts between states. Theoretical reasons also suggest that this will not change soon. States usually have less cost-intensive strategies to cope with environmental problems while the governing elites (which command the military) are rarely personally affected by these challenges (Salehyan 2008).

However, no consensus has yet been reached regarding the question of whether climatic changes increase the risk of intra-state violent conflicts, such as civil wars, paramilitary violence, riots or armed raids. This is a major shortcoming given that intra-state conflicts were more numerous and

[10] This chapter has been published in the following peer-reviewed publication: Ide, Tobias/Scheffran, Jürgen (2014): On climate, conflict and cumulation: suggestions for integrative cumulation of knowledge in the research on climate change and violent conflict. Global Change, Peace and Security 26 (3), 263-279. Table 1 has been updated. As the lead author, Tobias Ide is responsible for more than 90% of the chapter's content.

devastating than inter-state conflicts in the period between 1945 and 2010, a trend which is unlikely to reverse soon (Themnér/Wallensteen 2011). Two main positions can be distinguished in the debate:

a) Climate Conflict: This perspective makes a twofold argument (WBGU 2008). It starts from the assumption that climate change will cause or aggravate environmental problems including water scarcity, rainfall variability, soil degradation, or a rise in the frequency and intensity of natural disasters (such as storms, floods, or landslides). In a second step, these stresses might translate into societal problems commonly identified as increasing the risk of violent conflict, such as hunger (Pinstrup-Andersen/Shimokawa 2008), livelihood insecurity (Schilling et al. 2012), grievances about resource distribution and availability (Homer-Dixon/Blitt 1998b), predatory and opportunistic behavior by elites (Kahl 2006), outmigration (Reuveny 2008), or a weakening of the state (Barnett/Adger 2007). But whether environmental stress translates into societal challenges and eventually violent conflicts strongly depends on the sensitivity, adaptive capacity and resilience of the respective societies (Deligiannis 2012). This is why climate change-induced violence is most likely to occur in the marginalized areas of economically less-developed and politically unstable countries (Scheffran/Battaglini 2011).
b) Social Conflict: Proponents of this perspective claim that climate change plays no role, or only a minor role, in the onset of violent conflict. When facing environmental degradation, actors can react in various ways. Engaging in violent conflict is usually among the most costly and dangerous options (Salehyan 2008) and hampered by the interventions of state or traditional institutions (e.g. councils of elders) (Fjelde/von Uexkull 2012; Hagmann 2009). There is a wide consensus in conflict research about several political and socio-economic factors (e.g. medium level of democracy, low economic growth, past political violence) which raise the risk of intra-state violent conflict onset (Dixon 2009), while no such agreement exists about environmental or climate variables (Theisen et al. 2013). The by far greater importance of political and socio-economic factors in causing or triggering violent conflict is also underscored by the many cases in which environmental degradation does not coincide with violence (Barnett 2000).

The debate has not remained in the theoretical realm. The various arguments of both perspectives have been tested through in-depth case studies as well as large-N studies. From the qualitative case studies, no clear picture emerges regarding a possible link between climate change and violent conflict. Some authors argue that environmental problems (which are or will be exacerbated by climate change) contribute to the onset of violent conflict (Ember et al. 2012;

Kahl 2006; Nyong et al. 2006), while other studies challenge this claim (Adano et al. 2012; Benjaminsen 2008; Verhoeven 2011).

Evidence from statistical investigations on the link between adverse environmental changes and violent conflict are similarly inconclusive. This is shown by Table 1, which summarizes the large-N studies concerned with a possible climate-conflict link, which cover more than one country and have appeared in the peer review literature. Such studies use countries or more recently grid cells of 0.5 or 1.0° edge length as their spatial unit of analysis. They investigate whether a significant correlation exists between climate-related environmental changes in a given year and the onset or incidence of a violent conflict in the same or the following year. As can be seen from Table 1, only the conflictivity of land degradation seems to be nearly consensual, with five out of seven studies agreeing on that point. But this finding should be approached with caution, given that Fearon (2010) as well as Urdal (2005) find no correlation between cropland scarcity per capita and violent conflict. There are no quantitative studies about the climate-migration-conflict-nexus, presumably because of inadequate or incomplete migration data (Reuveny 2008).

Consequence of climate change	Significant relation to violent conflict onset[11]	No significant relation to violent conflict onset
higher temperatures	Burke et al. 2009 Hsiang et al. 2011 Landis 2014 O'Loughlin et al. 2012	Buhaug 2010 Couttenier/Soubeyran 2013 Koubi et al. 2012 O'Loughlin et al. 2014 Salehyan/Hendrix 2014 Wischnath/Buhaug 2014
reduced precipitation	Fjelde/von Uexkull 2012 Hendrix/Glaser 2007 Hendrix/Salehyan 2012 Hsiang et al. 2011 Miguel et al. 2004 Raleigh/Kniveton 2012	Buhaug 2010 Buhaug/Theisen 2012 Brückner/Ciccone 2010 Burke et al. 2009 Couttenier/Soubeyran 2013 Koubi et al. 2012 Meier et al. 2007 Nel/Righarts 2008 O'Loughlin et al. 2012 O'Loughlin et al. 2014 Salehyan/Hendrix 2014 Theisen et al. 2012 Wischnath/Buhaug 2014
more precipitation extremes	Hendrix/Salehyan 2012 Raleigh/Kniveton 2012	Koubi et al. 2012 Wischnath/Buhaug 2014
lower freshwater availability	Gizelis/Wooden 2010 Hauge/Ellingsen 1998 Raleigh/Urdal 2007	Couttenier/Soubeyran 2013 Hendrix/Glaser 2007 Salehyan/Hendrix 2014 Theisen 2008
land degradation	Biermann et al. 1998 Esty et al. 1999 Hauge/Ellingsen 1998 Raleigh/Urdal 2007 Theisen 2008	Hendrix/Glaser 2007 Rowhani et al. 2011
climate-related natural disasters	Besley/Persson 2011 Drury/Olson 1998 Hsiang et al. 2011 Nel/Righarts 2008	Bergholt/Lujala 2012 Omelicheva 2011 Slettebak 2012

Table 1: Overview about large-N studies concerning a possible climate-conflict link

Thus, the next logical step would be to identify why the findings of the different studies are so disparate, address the reasons for this inconclusiveness and then conduct the next wave of research which hopefully produces more consensual results. But in practice, there is no agreement (and, we suggest, not enough discussion) about the reasons for the inconclusiveness of previous research. Possible explanations include a lack of adequate theoretical arguments or comprehensive analytical frameworks (Meierding 2013; Scheffran et al. 2012c), missing interactions between quantitative and qualitative scholars (Solow 2013), choosing large-scale instead of minor violent conflicts as the dependent variable (Hendrix/Salehyan 2012), the focus on a too high level of analysis (e.g. whole states instead of singular regions or even households) (O'Loughlin et al. 2014) or the absence of high quality, high resolution data (Bernauer et al.

[11] Even if the relationship is weak, indirect or dependent on scope conditions.

2012). One might add the highly interdisciplinary nature of the subject matter, which is discussed by geographers, political scientists, environmental sociologists, political ecologists and anthropologists, and receives major inputs from natural scientists (e.g. physicists, soil scientists).

This chapter presents a different (but complementary) answer to the question of why there is still so much disagreement in research on climate change and violent intra-state conflict. In order to do so, it adopts a conceptual focus inspired by Dina Zinnes' (1976) classical essay on the problem of cumulation. Zinnes (1976: 162) distinguishes between two forms or levels of scientific cumulation:

> "By additive cumulation I mean that one study adds some information to the existing literature on the subject […] Integrative cumulation means that a study ties together and explains a set of research findings."

While additive cumulation is a precondition for integrative cumulation, the latter one should be seen as the ultimate goal of scientific research. Additive cumulation means that a study adds a new hypothesis, variable, correlation or finding to an existing body of knowledge. But Zinnes (1976: 163) is convinced that "most of us want to see a total picture." In other words: Most scholars will prefer an approach that is able to combine elements of previous works, to explain their results and eventually to make some meaningful statements about the subject under research as a whole (and not just single aspects of it). According to Zinnes (1976: 163), the key obstacle to an integrative cumulation of knowledge is the dominance of an "additive mentality" in a research field, that is, the assumption that producing more and more information on a topic is sufficient because the integration of this information into a wider and more complete picture would occur automatically.

Research on climate change and violent conflict has become much more integrative in recent years despite the heterogeneity of disciplines dealing with possible climate-conflict links (Hsiang et al. 2013; Schilling et al. 2014). However, we suggest that there are still many factors which promote an additive rather than integrative cumulation of knowledge in the research field, or in other words, that complicate the use, assessment and improvement of existing knowledge on the issue by future studies. In the following sections, we identify three relevant, but so far widely unacknowledged obstacles to the integrative cumulation of knowledge in the research on climate change and violent conflict, illustrate them with examples, and make suggestions as to how to overcome them. The problems discussed include inadequate labels, insufficient reflection on the limits of large-N investigations in the research field and the lack of attention paid to the environmental peace perspective. In order to address this last issue, we suggest an integrative theoretical framework for the environmental peace perspective which should make it easier for climate conflict scholars to integrate findings from this field of investigation.

2.2 Inadequate labels and terms

Several terms exist in the debate on climate change and violent conflict which are not sufficiently precise and/or are used in a confusing way. This is an important problem, especially bearing in mind that labels can have a large influence on how people judge a certain position. In International Relations, for instance, the Realist school coined the term "Idealism" in order to describe and simultaneously discredit the theories of their counterparts – a move that was largely successful despite the fact that the approaches covered by this label are often not rooted in idealistic perspectives (Osiander 1998). Thus, misleading terms tend to aggravate the cumulation of scientific knowledge.

A widespread label for the environmental or climate conflict perspective outlined above is Malthusianism or neo-Malthusianism, while proponents of the social conflict perspective are frequently termed cornucopians (Bernauer et al. 2012; Gleditsch 2003; Urdal 2008). By using these terms, it is implied that the logic behind the climate conflict hypotheses can be traced back to Thomas Malthus' 1798 "Essay on the Principle of Population" (Malthus 1992). Malthus took a deterministic position by describing the discrepancy between the linear growth of agricultural output and the exponential growth of human populations as an inevitable cause for human misery and conflict. Classical cornucopian positions, in contrast, make anti-deterministic claims that societies either will not face environmental problems like climate change or natural resource scarcity, or are able to conduct adaptation measures to avoid suffering from such problems (Lomborg 2001; Simon 1989). But there is an important difference between the cornucopian and the social conflict position: the latter do not deny the existence of environmental problems with severe and adverse consequences on human societies, but simply doubt whether they are empirically related to violent conflict onset (e.g. Theisen et al. 2013) .

A key issue with the label (neo-)Malthusianism is that the large majority of studies supporting the climate conflict perspective simply do not make use of deterministic arguments. This is true for recent studies which discuss a large number of relevant background conditions and intervening variables such as the commercialization of resources (Schilling et al. 2012), ethno-political exclusion (Fjelde/von Uexkull 2012), or "groupness" (Kahl 2006: 52). But also the writing of early environmental conflict scholars, which are most frequently termed Malthusian, rejects deterministic connections between renewable resource scarcity and violent conflict. Bächler (1998: 32) emphasizes that "passing the threshold of violence definitely depends on sociopolitical factors and not on the degree of environmental degradation as such", while Homer-Dixon/Blitt (1998b: 224) state:

> "The relationship between environmental scarcity and violence is invariably complex. Scarcity interacts with such contextual factors as the character of the economic system, levels of

> education, ethnic cleavages, class divisions, technological and infrastructural capacity, and the legitimacy of the political regime."

Since the attractiveness of positions which are considered deterministic is limited in social science contexts, researchers might ignore the findings and arguments of these supposedly "Malthusian" approaches. The efforts of some scholars show that the insights from Bächler and Homer-Dixon can fruitfully be refined, extended and applied to new questions in the research field (Deligiannis 2012; Kahl 2006; Mason et al. 2009). But the majority of environmental and climate conflict scholars continue to simply term these kind of works Malthusian or deterministic and do not further engage with them. The political ecology tradition of environmental conflict research, for instance, emphasizes the dominance of economic and political elites vis-à-vis marginalized groups in appropriating land, water, and forest resources (Jewitt 2008; Peluso/Watts 2001). Homer-Dixon stresses the importance of resource capture processes, meaning that the scarcity of important renewable resources "encourage[s] powerful groups within a society to shift resource distribution in their favor" (Homer-Dixon 1994: 10). This point (among others) provides an opportunity for fruitful discussion between Homer-Dixon's work and the political ecology tradition. But both approaches have so far largely either ignored or just criticized each other (e.g. Peluso/Watts 2003), amongst other reasons because the work of one side is continuously (and often simplistically) labeled Malthusianism. This prevents the additive cumulation of knowledge.

There are other labels which are used in a confusing or imprecise way in the research field. The dependent variable, for instance, is termed "armed conflict" (Theisen et al. 2013: 613), "violent conflict" (Scheffran et al. 2012a) or "civil war" (Wischnath/Buhaug 2014: 709). Many quantitative studies of the issue do not provide any clear definition of their independent variable. The large majority of the large-N studies cited in Table 1 refer to the UCDP/PRIO definitions (and datasets) (Scheffran et al. 2014), which understand armed conflict as "a contested incompatibility that concerns government or territory or both where the use of armed force between two parties results in at least 25 battle-related deaths. Of these two parties, at least one is the government of a state" (Gleditsch et al. 2002). This definition is at odds with many other studies which contend that climate-related violence is likely to (a) be rather small scale (i.e. below the 25 death threshold), (b) concern the use of natural resources (rather than government or territory), and (c) take place between social groups (i.e. without the involvement of governments actors) (Hendrix/Salehyan 2012; Nyong et al. 2006; Raleigh/Kniveton 2012). The impacts of climate change and the exact causal chains through which they manifest themselves are very likely to vary regarding, for example, urban riots, pastoralist fights around water points, and full-blown civil wars (Brown 2010; Ember et al. 2012; Johnstone/Mazo 2011). But at the moment, these different (and at times rather imprecise) definitions of the dependent variable are all too often

mixed together within the same analytical framework. This is aggravated by the fact that some studies focus on the onset and others on the incidence of violent conflict.

Similar theoretical issues exist with regard to inadequate definitions of the independent variable. Many theoretical and empirical studies do not yet distinguish strongly enough between the condition of natural resource scarcity (e.g. absolute water scarcity) (Homer-Dixon 1994), the long-term process of natural resource degradation (e.g. steady precipitation decline) (Hendrix/Salehyan 2012), and short-term processes of rapid environmental deterioration (e.g. droughts and flash floods) (Reuveny 2007). In addition, the labelling of the independent variable as climate change is problematic in many of the quantitative studies cited in Table 1, since they focus on temperature and precipitation changes within short time periods (usually a year), while climate is usually defined as the average of meteorological conditions over time period of at least thirty years (Gleditsch 2012). A broader and more systematic consideration of these issues has so far not been conducted in the research on climate change and conflict. Doing so would facilitate communication within the research field, stimulate more extensive exchange with related disciplines such as conflict research or meteorology, and thus facilitate integrative cumulation of knowledge.

2.3 The limits of large-N studies

Methodologically, this research field has been dominated by statistical large-N analyses. For instance, four out of the six most recent literature reviews that appeared in leading journals draw overwhelmingly or exclusively on large-N studies in order to evaluate the state of the art (Hsiang et al. 2013; Koubi et al. 2014; Scheffran et al. 2012b; Theisen et al. 2013). Deligiannis (2012) and Meierding (2013) are the notable exceptions, although the later focuses in large parts on strategies for improving large-N studies. A similar example is provided by two widely cited special issues on climate change and conflict (Gleditsch 2012; Nordås/Gleditsch 2007). Twelve of the 20 articles (=60%) published in both issues conduct large-N statistical analysis, while only two studies draw primarily on case study evidence (10%).

Large-N studies supply important insights about the generalizability of theories and case study findings. However, by producing a growing number of correlations for more regions and longer time-periods, a largely additive cumulation of knowledge is promoted. Especially in research on the climate-conflict nexus, there have been serious problems with integrating the findings of previous studies. There are two reasons for this, neither of which have been considered at length thus far:

Firstly, statistical analyses of a large number of cases are inherently unsuitable for integrating factors which are hard to quantify, but are nonetheless crucial for the dynamics of (climate-

related) violent conflicts, such as identities, narratives or threat perceptions (Fröhlich 2012; Kaufman 2001). Other relevant factors, for example the existence of migrant networks (Gioli et al. 2013) or traditional, micro-level resource-sharing agreements (Bogale/Korf 2007), may be quantifiable, but collecting data on them for a large number of cases would be very labor- and cost-intensive. Thus, the concepts and findings of environmental sociology, anthropology, political ecology, spatial theory and constructivist conflict research are hardly ever taken into account when scholars are assessing a possible climate-conflict-link (Chojnacki/Engels 2013; Martin 2005; Timura 2001).

In addition, there might be some indicators on which data could be collected more or less easily, but simply no one has done this yet, so no large-N study can incorporate these concepts. There is a possibility that the generalizability of excellent hypotheses is not tested since no adequate large-scale datasets for doing so are available. Raleigh/Urdal (2007: 678), for instance, quite explicitly state that their variable selection is strongly driven by data availability issues: "Despite its theoretical importance, we do not attempt to empirically capture resource distribution, as such data are currently not available on the local level."[12]

Secondly, the weaknesses of the datasets which are currently available and widely used are hardly ever reflected in the research on climate change and violent conflict, while doing so is a precondition for the integrative cumulation of knowledge. Rainfall or temperature data are often based on satellite measurements, but it is well known that there can be huge differences between the perceptions of local inhabitants and of scientific experts or orbit satellites about the speed, degree and causes of environmental changes (Murtinho et al. 2013; Wittayapak 2008). The GLASOD data on land degradation used by most studies cited in Table 1 have been criticized for relying on the assessments of few experts using inconsistent definitions (Benjaminsen 2008). Similarly, datasets which collect and geo-code occurrences of low-level violence (the most likely forms climate-related conflicts are going to take) are increasingly used by quantitative studies (see Table 1), but are unable to adequately capture episodes of violence in remote areas.

In order to illustrate this last point, we isolated data on pastoral violence in East Africa, probably the most discussed form of violent conflict in the research field, from ACLED (Raleigh/Kniveton 2012) and SCAD (Hendrix/Salehyan 2012), which are the most elaborated and most often used geo-referenced datasets on low-level violence. We compared these data with the conflict records of CEWARN (2010), which collects information on pastoral violence through field research. Since information on these periods and regions is available in all three databases, our comparison focused on the years 2006-2009 and on the Ethiopian and Kenyan side of the Somali cluster as well as on the Kenyan and Ugandan side of the Karamoja cluster.

[12] This example is also highlighted by Chojnacki/Engels (2013: 12).

As can be seen from Figures 1 and 2, CEWARN collected 1.547 incidents of pastoral violence with 3,000 deaths between 2006 and 2009, while ACLED registered only 258 incidents (16.7% of the amount of incidents collected by CEWARN) with 1,025 deaths (34.2%). Using SCAD, we could only detect 17 incidents (1.1%) responsible for 412 deaths (13.73%) for the same period. These results indicate that – with the partial exception of ACLED's performance for the Kenyan side of the Somali cluster – even these quite elaborated datasets miss a large percentage of the violent conflicts occurring on the ground. These findings are supported by Ravnborg et al. (2012) who also conclude that the large majority of water-related conflict (and cooperation) events in the global South are not recognized by NGO publications and media reports (which are the main sources for ACLED and SCAD). If the sample of conflict events recorded by ACLED or SCAD is not representative (which is likely given factors such as urban or media biases in the reporting of such events) (Simons/Zanker 2012), the validity of the large-N studies correlating these data with environmental or climatic changes is questionable.

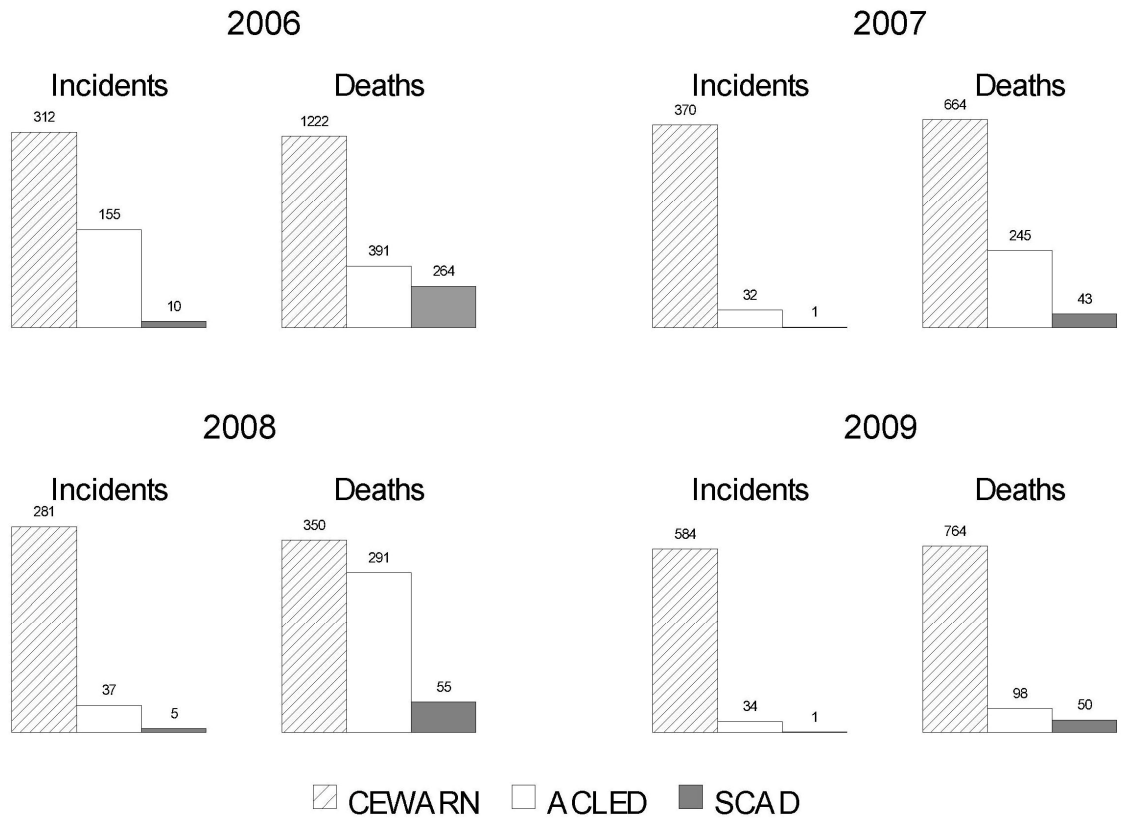

Figure 1: Pastoralist conflicts recorded by year

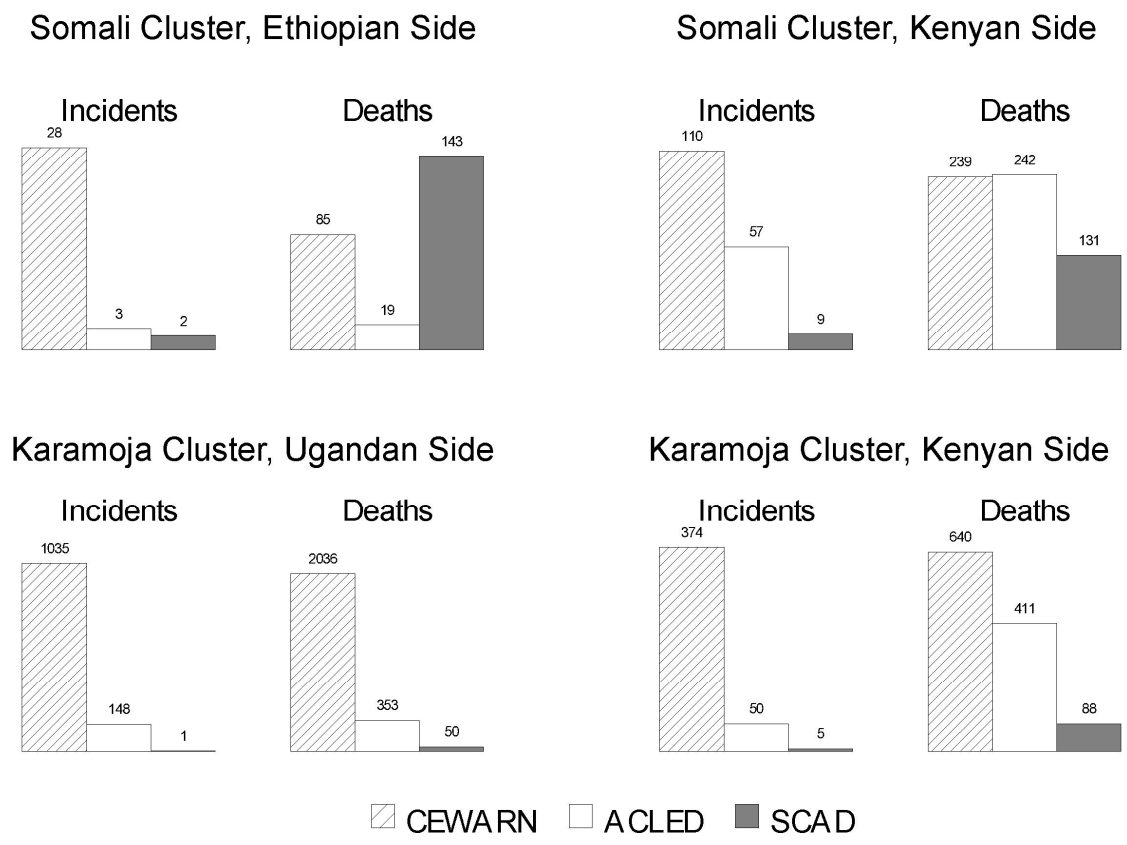

Figure 2: Pastoralist conflicts recorded by cluster

As mentioned above, large-N studies have made several valuable contributions to the literature in terms of testing the generalizability of hypotheses and identifying theoretical deficits and data needs. The collection of local-level data through field research, as has already been done by some studies (Ember et al. 2012; Witsenburg/Adano 2009), can further increase the validity of statistical analyses. But given their constraints, they should increasingly be complement by qualitative research strategies. This goes well beyond calls to use in-depth case studies in order to assess which causalities are driving the correlations found by large-N studies or to generate hypotheses which have to be tested by quantitative analyses. Although these are important challenges, qualitative research can contribute more to our knowledge on climate change and violent conflict. If appropriately designed, case studies cannot only generate, but also test hypotheses, for instance when extreme or critical cases are investigated or by using most similar or most diverse cases techniques (Flyvbjerg 2006; Gerring 2007). The intensive comparison of a medium number of cases has greatly elaborated our knowledge of the links between natural resource abundance and violent conflict (Le Billon 2001; Ross 2004). This has been the case because such research designs combine a high generalizability of their results with an incorporation of factors that are hard to collect for a large number of cases or to quantify at all (e.g. identities or micro-level institutions).

2.4 Taking the environmental peace perspective into account

So far the discussions in the research field have overwhelmingly focused on whether or not climate change does increase the number of violent conflict occurrences. Little attention has been paid to a possible link between climate change and peace, defined here in a narrow sense as the absence of violent conflict. While a number of large-N studies find a significant correlation between violent conflict and climate change or variability (see Table 1), several studies indicate a relationship between a reduced risk for violent conflict onset and freshwater scarcity (Hendrix/Glaser 2007), reduced precipitation (Buhaug 2010; Theisen 2012; Witsenburg/Adano 2009), natural disasters (Slettebak 2012), or the scarcity of arable land (Rowhani et al. 2011; Theisen 2012; Urdal 2005). Some case studies conducted in East Africa's pastoral areas found that violent cattle raids are less frequent during times of drought, either because opportunities for raids are unfavorable or because culture-specific rules and norms command cooperation during harsh times (Adano et al. 2012; Bogale/Korf 2007). A whole body of literature on environmental peacebuilding deals with the question whether and under which circumstances the shared handling of environmental problems affecting two or more social groups can contribute to the improvement of relations between those groups (Carius 2006; Conca/Dabelko 2002a). Similarly, disaster diplomacy studies focus on the possibility of cooperation between hostile groups, induced by natural disasters (Kelman 2012; Streich/Mislan 2014).[13] In the following, we term this body of literature the environmental peace perspective.

So far, there is little exchange between researchers working on environmental peace and those dealing with possible links between environmental/climate change and violent conflict. This is unfortunate because the insights gained by the literature on environmental peace could help climate conflict scholars to understand (a) which factors make societies resilient to environmental stress and violent conflict, (b) the influence of environmental stress on changing intergroup relations (from cooperation to conflict to violence and vice versa) and (c) the conditions under which cooperation around environmental problems fails and environmental conflicts therefore become more likely.

Thus, drawing more strongly on approaches developed and insights gained by environmental peace scholars would benefit the debate about the climate-violence nexus and enhance integrative cumulation of knowledge in the wider research on the role of environmental factors in facilitating peace and conflict. However, one problem in this regard is that there is little interaction between the various research traditions of the environmental peace perspective. Therefore, we use the remainder of this section to suggest an integrative theoretical framework for the environmental

[13] See www.disasterdiplomacy.org for recent developments in the field.

peace perspective[14] in the hope that this will facilitate exchange between research on environmental peacebuilding, disaster diplomacy and environmental/climate conflict.

When defining peace as the absence of inter-group violent conflict, one can distinguish three phases of the process through which shared environmental problems stimulate peace. These phases can be examined from two different theoretical approaches (Figure 3).

We call the first approach sociological since it draws on insights from early disaster sociology (e.g. Durkheim 1979). As noted by Charles E. Fritz (1996: 28-30), disasters usually produce a "community of sufferers" which is "characterized by a strong feeling of mutual suffering and in-group solidarity" and "develops an interactional system uniquely its own", meaning that pre-disaster social, ethnic or political cleavages lose their salience. In a similar way, post-disaster suffering can create empathy between/with the parties affected (Ker-Lindsay 2000). This reduces the likelihood of violent conflict onset and might even stimulate cooperation between the affected groups (Gaillard et al. 2008; Slettebak 2012). This claim should hold true for slow-onset disasters (e.g. droughts) and even more so for rapid-onset disasters (e.g. a cyclones). In a second step, the regular interaction of people from different social groups in order to manage common environmental (or disaster-related) challenges can create mutual trust and understanding, thereby laying the foundations for further cooperation (Lejano 2006). In the final (and more ideal-typical) phase, the perceptions of the involved parties are transformed due to constant interaction and a common identity is (partially) developed (Conca 2002).

The second approach has its intellectual roots in functionalist and neo-functionalist theory (Haas 1970). It argues that environmental problems tend to cross the borders between various social groups (environmental interdependence), thus providing material incentives for all affected parties to work together along functionalist rather than territorial or ethnical divides (Ali 2007; Harari/Roseman 2008). Such cooperation can be initiated by political or economic elites (top down) as well as by civil society (bottom up) – a claim that is shared by the functionalist and the sociological approaches (Conca/Dabelko 2002a). After cooperation is initiated during the first stage, the occurrence of spill-over effects represents the second stage of environmental peace realization as outlined by the functionalist approach (Akcinaroglu et al. 2011). Spill-over in this context means that bi- or multilateral environmental cooperation "will set in motion economic, social and political progresses which generate pressures towards further integration" (Tranholm-Mikkelsen 1991: 4). Finally, there is no genuine third phase within the functionalist approach. All authors agree that "the creation of a common regional identity [… and] mutually recognized rights and expectations" (Carius 2006: 11) rather than the rational engagement in more and more

[14] For criticism of the environmental peace perspective see for instance Hsiang et al. (2013) or Nelson (2010).

cooperation due to functional needs represents the final stage of environmental-induced peace development.

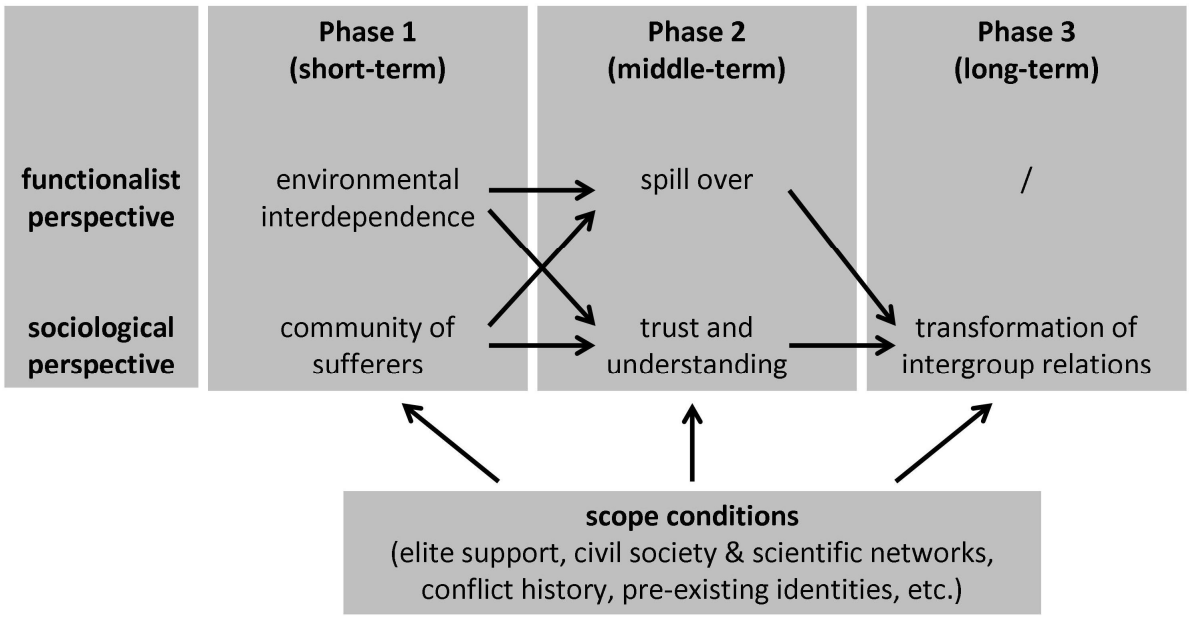

Figure 3: Theoretical framework of the environmental peace perspective

Based on existing empirical research, one can further specify the framework presented above. Firstly, both the sociological and the functionalist approaches agree that the three phases develop consecutively over time, while it can be assumed that during all phases the risk of violent conflict onset is reduced. But the process of creating peace through being affected by or cooperating over shared environmental problems can fail at the initial phase or before entering the second and third phases respectively, with the potential to frustrate and alienate hostile groups even further (Conca et al. 2005). According to Kelman (2012), this is empirically even the most likely outcome. The symbolic embedment of natural resources in contradictive narratives and identities, the ignorance of the needs of local inhabitants, as well as trade-offs between ecological conservation and economic utilization are, among other factors, critical obstacles to a peace-inducing effect of environmental problems (Conca/Wallance 2012; Green 2010).

Secondly, there are several conditions which are likely to facilitate the development of environmental peace, such as the absence of recent occurrences of violence, the active involvement of civil society organizations and scientific networks or the existence of mutual trust and elite support (Carius 2006; Feil et al. 2009; Kelman 2006). Thirdly, as already implied by the last two statements, political and socio-economic factors are more important for the existence of peace than shared environmental problems or environmental cooperation, especially in the long run (Kelman 2006). And fourthly, although they can clearly be distinguished on a theoretical

basis, elements of the sociological and functionalistic approach are usually intertwined in the frameworks of most empirical studies and even more so in the real situations on the ground.

The environmental peace perspective described here has not received sufficient scholarly attention until now, and consequentially, many tasks for future research remain (Streich/Mislan 2014). There are only few comprehensive case studies on the link between (climate change-induced) environmental stress and the absence of violence, especially on the intra-state level. While many large-N studies on environmental or climate change and violent conflict exist, there is no statistical analysis explicitly concerned with environmental peace. Such studies could ask, for instance, whether all environmental problems have similar impacts or whether there are differences between, for example, soil degradation, tropical storms and droughts. It is also worth knowing whether environmental problems stimulate just the absence of violence, or even the occurrence of cooperation, or both, or none of these outcomes. Since, to our knowledge, no subnational, geo-referenced dataset on cooperative behavior exists, we suggest either to operationalize the Global Data on Events, Location and Tone (GDELT) dataset which covers all kinds of (not just conflict or violent) events (Leetaru/Schrodt 2013) or to collect local level data through field research (Ravnborg et al. 2012). The last option would also help to overcome some of the problems with large-N studies described in the previous section. Case and statistical studies should also take seriously the three-staged model derived from the literature above and investigate whether the occurrence of environmental problems lead to the absence of violence/onset of cooperation in the short-, medium- or/and long-term.

2.5 Conclusion

This chapter started with a review of the existing literature on climate change and violent conflict, which has its roots in the research on environmental conflicts. While climate change is unlikely to be associated with inter-state wars, there is no consensus regarding a possible link between climate change and intra-state violent conflicts. We claimed that one reason for this disagreement between climate conflict scholars is the lack of integrative cumulation of knowledge (as defined by Zinnes) in this highly interdisciplinary research field.

Based on this assumption, three suggestions for facilitating integrative cumulation of knowledge in the research on climate change and violent conflict have been formulated. Firstly, authors should avoid confusing terminology. The labels cornucopian and Malthusian as well as the operationalization of key variables were discussed in greater detail. Secondly, the limits of large-N studies in the research field should be reflected more carefully in order to assess the explanatory power of these studies, improve their design and complement them with good qualitative research. These limits are the availability of data – especially on concepts such as identities or

micro-level institutions – and the reliability of existing datasets. Possible solutions for this include the collection of local-level data through field research or to rely stronger on systematically designed case studies. Thirdly, climate conflict researchers would benefit from insights in and approaches of the environmental peace literature in order to gain a more complete understanding about the importance of environmental factors in inducing cooperation, conflict and violence. Such a perspective could also draw our attention to possible opportunities for improving inter-group relations which are opened up by climate change. In order to facilitate exchange between both areas of study, we suggested an integrative framework for the environmental peace perspective

There are certainly other problems regarding the integrative cumulation of knowledge in the research on climate change and violent conflict. These are either examined by other recent reviews of the literature or remain to be discussed in future works. To name just three examples: There are other communication problems besides confusing labels which aggravate the integrative cumulation of knowledge, such as the lack of exchange with scholars from the global South with a high expertise on the regions under discussion. Similarly, the environmental peace perspective is not the only insightful approach that is hardly ever considered by research on climate change and violent conflict. As discussed above, exchange with political ecologists could be especially productive since both approaches focus on a similar subject matter (e.g. Dietz/Engels 2014). Finally, Nordås/Gleditsch (2007: 634) encouraged scholars several years ago to "balance the positive and negative effects of climate change", for instance by taking into account longer growing seasons in higher latitudes or increasing precipitation levels in some regions. But this call has widely gone unheard, with the partial exception of some studies highlighting the positive impacts of migration (Black et al. 2011; Scheffran et al. 2012e).

Based on our experience of conducting research on climate change and violent conflict, we discussed three obstacles to the integrative cumulation of knowledge that we believed to be among the most relevant and most unnoticed to date. We hope that the suggestions developed above stimulate discussion among researchers and contribute to the answering of the question of whether, and if so under which circumstances, climate change stimulates violent conflict - or even peace.

3 On exposure, vulnerability and violence: spatial distribution of risk factors for climate change and violent conflict across Kenya and Uganda[15]

3.1 Introduction

In recent years, possible connections between climate change and violent conflicts have received increased attention by the scientific and policy community (Meierding 2013). The causal links are yet unclear and the magnitude of the effect of climate change on violent conflict is heavily discussed (Scheffran et al. 2012c; Theisen et al. 2013). This is especially the case for East Africa, which is seen as a region highly vulnerable to climate change (World Bank 2013b). Several recent studies indicate a link between higher temperatures (Hsiang et al. 2011; Maystadt/Ecker 2014; O'Loughlin et al. 2012) or lower precipitation (Ember et al. 2012; Fjelde/von Uexkull 2012; Hendrix/Salehyan 2012; Raleigh/Kniveton 2012) and violent conflict in this region. They are challenged by other analyses finding no significant impact of temperature increases (Buhaug 2010) or precipitation decreases (O'Loughlin et al. 2012; Theisen 2012; Theisen et al. 2012) on violent conflict onset in East Africa.

This debate is not settled yet, and we will not assess in this chapter *whether* a link between climate change and violent conflict exists in East Africa. Our study rather addresses the question *where* such a link is most likely to occur. Climate change does not affect all parts of the region in the same way. The magnitude of the warming as well as the trend and degree of precipitation changes show considerable local variations (Hulme et al. 2001; IPCC 2013). Furthermore, some regions, such as coastal areas (facing flood risk) or arid regions (facing drought risk), are more exposed to extreme weather events. And finally, even if areas with similar geographic characteristics are afflicted by similar climatic changes, their adaptive capacities and resilience to violent conflict are likely to differ considerably (Adger 2006; Barnett/Adger 2007).

So if climate change is a cause of violent conflicts, then such a link is most likely to occur in regions which simultaneously suffer from adverse climate change, have few capabilities to cope with these changes, and are characterized by pre-existing tensions and conflict (Gemenne et al. 2014; Raleigh et al. 2014). But until today, few efforts have been made to identify these regions. This chapter addresses this gap by using a multi-method approach. It develops a composite risk

[15] This chapter has been published in the following peer-reviewed publication: Ide, Tobias/Schilling, Janpeter/Link, Jasmin S.A./Scheffran, Jürgen/Ngaruiya, Grace/Weinzierl, Thomas (2014): On exposure, vulnerability and violence: spatial distribution of risk factors for climate change and violent conflict across Kenya and Uganda. Political Geography 43 (1), forthcoming. As the lead author, Tobias Ide is responsible for the majority of the chapter's content. He contributed about 80% to the introduction and theoretical background, more than 90% to the risk analysis, more than 50% to the quantitative evaluation, about 40% to the qualitative evaluation (the Karamoja case and the discussion) and about 80% to the conclusion.

index (CRI), which consists of exposure, vulnerability, and violent conflict risk variables, has a spatial resolution of 0.5 decimal degrees (°) and focuses on Kenya and Uganda in the year 2008.

We choose to limit our analysis to this reference year and region because the availability, quality and resolution of environmental and socio-economic data up to 2008 is comparatively good for both countries. The other reason for our regional focus is that the debate on environmental or climate change and violent conflict often focuses on Kenya and Uganda (e.g. Adano et al. 2012; Eaton 2008; Inselman 2004; Schilling et al. 2012). Therefore, we can also draw on a rich literature to specify our model and contrast it with the findings of other studies as well as with our own case studies.

Our analysis contributes to the existing literature in several ways. It enables qualitative researchers to create most likely-, most unlikely-, most similar systems- or most different systems-research designs, which improves the contribution of case studies to the wider literature on climate change and violent conflict (chapter 2). For instance, if a study is unable to detect a relationship between climate change and violence even in highly exposed, vulnerable and conflict prone areas, this would be a strong argument against a supposed climate-conflict-link in East Africa (Gerring/Seawright 2007). The various maps created on the basis of the risk analysis furthermore facilitate the comparison of commonly used datasets with the results of case studies and field observations (Gleditsch/Weidmann 2012). Such "ground checking" can help to improve the quality of the respective datasets and is thus likely to benefit future large-N studies. The risk index also provides a valuable tool for policy makers, development workers and security analysts interested in the geographic distribution of the risk factors for climate change and violent conflict. Our study thus contributes to the increasing literature on "climate change hotspot mapping" (de Sherbinin 2014: 23). Finally, our analysis integrates qualitative and quantitative approaches and thus follows recent calls to integrate various methods in the research on climate change and violent conflict (Meierding 2013; Scheffran et al. 2012b).

This chapter proceeds as follows. The theoretical background is introduced in the next section. In section three, we analyze the spatial distribution of the risk factors for climate change and violent conflict in Kenya and Uganda in 2008 and integrate them into a CRI. This analysis is based on a literature review and on quantitative datasets for the years 1998 to 2008. The results are presented in the form of various risk maps with a spatial resolution of 0.5° (equal to 55.5 kilometers at the equator). In section four, we contrast the findings of the risk analysis with conflict data for the year 2008 as well as with three case studies of Loitoktok (Kenya), Southern Turkana-Pokot North (Kenya) and Karamoja (Uganda). While geo-referenced conflict datasets allow a quantitative validation of the CRI, case studies are helpful since they can evaluate the

findings of the CRI and its individual components in greater depth. In the final section, we present our conclusions.

3.2 Theoretical background

A violent conflict is given when the opposing interests of two or more social groups clash and at least one of the groups uses direct, physical violence in order to enforce or articulate its interests. While most proponents of the climate-conflict thesis agree that environmental violence "tends to be subnational, diffuse, and persistent" (Homer-Dixon/Blitt 1998a: 11), some studies also suggest a link between large-scale intra-state violent conflicts and climate change (e.g. Burke et al. 2009). There are several possible ways to define and operationalize climate change. We focus on short- to medium-term temperature and precipitation changes which are common proxies for adverse climate change (e.g. Fjelde/von Uexkull 2012; O'Loughlin et al. 2012). The main reason for this is that climate change will increase the number of short- to middle-term extreme events, which are more likely to influence conflict patterns than changing long-term averages (e.g. Meierding 2013). It is acknowledged in the literature that temperature and precipitation changes are at best one among many other causal factors of violent conflict onset, but have the potential to indirectly act as "threat multipliers" (Gemenne et al. 2014: 3).

Various pathways linking climate change and violent conflict have been considered (Gleditsch 2012; Scheffran/Battaglini 2011). For instance, several studies in social psychology indicate that higher temperatures cause an increase in human aggression, which can transform into inter-group conflict and violence (Anderson/DeLisi 2011). Higher temperatures and reduced precipitation can also cause scarcities of water, food and arable land, which might lead to inter-group competition and grievances (Homer-Dixon/Blitt 1998a; Schilling 2012). These resource scarcities can furthermore undermine the capability of the state (e.g. if it loses legitimacy) and thus its capacity to prevent inter-group conflicts (Kahl 2006). Finally, opportunity costs for joining a violent group decrease during times of drought, especially in countries with a population heavily dependent on agriculture, such as Kenya and Uganda (Barnett/Adger 2007).

In order to assess the distribution of risk factors for climate change and violent conflict, we utilize a theoretical model based on three categories. In accordance with the Intergovernmental Panel on Climate Change (IPCC 2012: 30-36), we first distinguish between exposure and vulnerability to climate change. Exposure means that a particular location is "adversely affected by physical events" (IPCC 2012: 32), in our case temperature and precipitation extremes. Vulnerability is defined as the "predisposition to be adversely affected" (IPCC 2012: 32). This understanding of vulnerability has two components, sensitivity and adaptive capacity. Sensitivity "is the degree to which a system is modified or affected by perturbations" (Adger 2006: 270).

Some areas, for instance, are characterized by a high percentage of the population depending on agriculture for income and food generation, thus making them more sensitive to droughts than places with a strong tertiary sector. Adaptive capacity is defined as the ability of a system to change in order to cope with the stress it is facing due to its exposure and sensitivity (Adger 2006). Examples of adaptation measures include irrigated agriculture or insurance schemes against environmental risks.

However, even a region heavily exposed and very vulnerable to climate change may not experience violent conflict because violent conflict is a complex product of multiple and interacting factors. Even strong proponents of an environment-conflict link claim that "passing the threshold of violence definitely depends on *sociopolitical* factors" (Bächler 1998: 32). Therefore, the general risk of violent conflict onset is considered as the third component of our risk analysis. The general risk of violent conflict is defined as the likelihood of a violent conflict to break out in a certain area.

Thus, the composite risk index (CRI) will be high for those locations which simultaneously experience a high exposure to adverse temperature and precipitation changes, a high vulnerability vis-à-vis these changes, and a high general risk of violent conflict onset. If climate change increases the risk for violent conflict onset, we assume that this is most likely to happen in these areas.

3.3 Analyzing the spatial distribution of the risk factors for climate change and violent conflict

Although there is plenty of sub-national quantitative social, environmental and conflict data available for Kenya and Uganda, we need to find a combination of variables that represents the exposure to climate change, the vulnerability to climate change, and the onset of violent conflict well. The ACLED dataset (Raleigh et al. 2010) can be used to measure violent conflict and thus can serve as a dependent variable in a regression model to search for variables indicating a general risk for violent conflict onset in Kenya and Uganda for the period 1998-2007. The variables that turn out to be sufficient can then be used to for the risk analysis. For each the exposure and the vulnerability to climate change, no adequate dependent variable to be used in a regression analysis could be found. Thus, we draw the indicators for exposure and vulnerability directly from the relevant literature. We check all of the suggested variables for pairwise autocorrelations in the years 1998-2007 to maximize the explanatory power of the CRI for the application year 2008.[16]

[16] Replication data for all analyses conducted in this section can be found in Appendix I.

3.3.1 Selection of Variables

3.3.1.1 Exposure to climate change

Each of the three broad categories discussed above is operationalized through various indicators. Higher temperatures and reduced precipitation are chosen as key indicators for exposure to climate change. This choice is supported by various studies which find a link between these indicators and adverse changes in biological and social systems in East Africa (e.g. Battisti/Naylor 2009; World Bank 2013b). We use the average yearly precipitation in the period 2004-2008 compared to the period 1979-2008 to operationalize precipitation changes. With this measurement, we account for the fact that a single wet year is insufficient to compensate the negative effects of various preceding dry years (Temesgen 2010: 24). Since small changes in precipitation have a much stronger influence in areas with low annual rainfall, we divide the precipitation value through the long-term average for the period 1979-2008. The choice of an appropriate indicator for temperature increases was more difficult because some authors argue for a short-term link between extreme heat events and violence (e.g. Anderson/DeLisi 2011; Maystadt/Ecker 2014), while others highlight the importance of medium-term changes in average conditions (Barnett/Adger 2007; Wischnath/Buhaug 2014).[17] In order to capture both arguments, we use the change of the annual mean temperature between 2007 and 2008 to operationalize temperature changes (see also Meierding 2013). We also tested two alternative specifications, namely the deviation of the temperature in 2008 and in the period 2004-2008 from the 30-year mean, but both performed considerably worse in the quantitative and the qualitative evaluation procedure described in section 4. Climate data is obtained from the PRIO-Grid dataset (Tollefsen et al. 2012).

3.3.1.2 Vulnerability to climate change

With regard to Africa, Busby et al. (2012)[18] suggest three indicators for measuring vulnerability, namely household and community vulnerability, governance vulnerability/political violence, and population density. The household and community vulnerability basket consists of four indicators: access to daily necessities, health, access to healthcare, and education. Education has long been recognized as a key factor for reduced sensitivity to and enhancing the adaptive

[17] Both measurements can be justified on the basis of the recent IPCC (2013) report, which predicts higher average temperatures as well as more heat anomalies for East Africa.

[18] There are various differences between our analysis and the approach of Busby et al. The four major ones in our view are: a) Busby et al. identify areas vulnerable to climate-related hazards, while we focus on the spatial distribution of risk factors for climate change and violent conflict. b) Busby et al. do therefore not incorporate a general violent conflict risk component, while we do. c) Busby et al. prioritize data that are available for large parts of Africa, while we prioritize data that that are available at a high spatial resolution for Kenya and Uganda. d) Busby et al. use the historic occurrence of climate-related disasters as the exposure indicator, while we use short- to medium-term temperature and precipitation changes.

capacity vis-à-vis adverse environmental changes (UN 2004), inter alia because well-educated people are better prepared to find employment outside the agricultural sector or to introduce innovations. In this study, the level of education is measured by the percentage of people who never went to school (KOD 2009; UBOS 2006). Access to daily necessities is important since populations with sufficient caloric intake and access to clean water are less vulnerable to climate change. Following Busby et al. (2012), we use child malnutrition as a proxy for this indicator and collect data on it from various Demographic and Health Surveys (DHS Program 2013). Finally, we consider the concepts health and access to healthcare as closely related and thus use only one indicator for them. Healthy populations can be considered less vulnerable to climate stress such as heat waves or drought-related malnutrition. Infant mortality is usually considered as the best proxy for the health of a given population (Reidpath/Allotey 2003) and appropriate data is available from the DHS Program (2013).

A high population density indicates a large number of persons affected by an extreme event and limited capacities for adaption through, for instance, migration or more extensive cultivation. Similarly, past political instability/violence has a strong negative effect on the assets and available coping strategies of individual households (Eriksen/Lind 2006). Data on population density is calculated on the basis of the PRIO-Grid data. The incidence of at least one conflict in the previous year (2007) according to the ACLED dataset is used as an indicator for past political instability.

We also include two additional indicators for vulnerability to climate change not discussed by Busby et al. (2012). The first one is environmental dependence, measured through the percentage of the population economically dependent on agriculture (FAO 2013). Regions characterized by a high dependence on agriculture can be expected to be especially sensitive to climate change, which has the potential to undermine agricultural production (Battisti/Naylor 2009). Secondly, we consider soil degradation as an important factor increasing the vulnerability to climate change because degraded soils are very sensitive to temperature and precipitation extremes (Al-Kaisi 2000). Information on soil degradation is obtained from the GLASOD dataset (ISRIC 1990), which is still considered the most comprehensive global dataset on soil degradation (Sonneveld/Dent 2009). Recent studies also highlight the role of local social and cultural institutions in adapting to environmental changes (Adano et al. 2012; Bogale/Korf 2007). Unfortunately, no comprehensive datasets on this indicator are currently available, so we cannot include it into the analysis.

3.3.1.3 General risk of violent conflict onset

Possible indicators for the general risk of violent conflict onset are extracted from the literature on the drivers of civil war onset. Civil war research has yet produced the most elaborated results regarding the causes for violent conflict onset, and there are theoretical as well as (preliminary) empirical evidence suggesting that "low-intense disturbance events can be explained by conventional correlates of civil war" (Buhaug et al. 2012: 6). But the question remains whether the factors identified as relevant by the general literature on civil war can explain the onset of low- and high-intensity violent conflict events in Kenya and Uganda around 2008? In order to address this issue, we perform a regression analysis using all factors identified as relevant for the onset of civil war by two meta-studies (Dixon 2009; Hegre/Sambanis 2006) as independent variables: low economic growth, medium level of democracy, low level of development, large population and recent political conflicts. We use data on GDP growth by the World Bank (2013a) and on population size by PRIO-Grid. The level of development is measured by data (a) on the under-five mortality rate as provided by the DHS Program (2013) and (b) on the gross cell product (GCP) per capita as provided by PRIO-Grid. We use a binary measure of the incidence of ACLED conflict events (Raleigh et al. 2010) in the previous year as an indicator for past conflicts. Finally, in accordance with current research standards (Vreeland 2008), the executive constraints (*xconst*) value of the Polity IV dataset (Marshall et al. 2012) is utilized as an indicator for the level of democracy. The more the *xconst* score of a country deviates from four, the more it is either an autocracy (1-3) or democracy (5-7), and the less likely it is to experience violent conflict onset (Vreeland 2008).

We use the occurrence of at least one conflict event per year according to the ACLED dataset, which is geo-referenced and has a low inclusion threshold, as the (binary) dependent variable. The regression analysis is performed for the decade prior to the reference year of our risk analysis (1998-2007). All independent variables (with the exception of past conflict) are lagged by one year in order to account for endogeneity. The various datasets are transformed into the PRIO-Grid cell format which, for our area of interest, consists of 306 grid cells with an edge length of 0.5°. Missing values are extrapolated from circumjacent years or cells. We run the analysis with a linear and with a logit regression model, but the signs and the significance levels for the different variables do not change. The results are presented in Table 2.[19]

[19] The residuals have been tested for autocorrelation. The result of the Durbin-Watson-Test was 2.079, which implies that no autocorrelation is present.

Variable	Linear model		Logit model	
	β	SE	β	SE
GDP growth	.078***	.003	.081***	.019
xconst deviaton from 4	-.07***	.016	-.428***	.108
under-five mortality	-.016	.0	-.002	.157
GCP per capita	.015	.0	.0	.0
population size	.171***	.0	.000***	.0
past conflict (ACLED)	.336***	.017	1.616***	.244

Table 2: Results of the regression analysis for violent conflict incidence, 1998-2007
*** = p < 0.01; ** = p < 0.05; β = standardized coefficient; SE = standard error; N = 3060; dependent variable: violent conflict (ACLED)

Table 2 shows that population size and the occurrence of conflict events in the previous year are positively and significantly related to the binary ACLED conflict variable. The significant and negative effect of a deviation from the *xconst* value of four also indicates a link between a medium level of democracy and a high risk for violent conflict onset. There is no significant relationship between either the under-five mortality rate or the gross cell product per capita and conflict occurance. Finally, GDP growth is significantly and positively related to the dependent variable. This is surprising and contradicts much of the existing literature (Hegre/Sambanis 2006). We are thus cautious about this finding and will present one specification of the risk index with and one without the economic growth indicator. Based on the regression analysis, we therefore use a medium level of democracy, a large population, the occurrence of a conflict event in the preceding year, and high economic growth (although with some caution) as indicators for a high general risk of violent conflict onset.

3.3.2 Synthesis of Variables

After converting all available data on the remaining indicators into the unified spatial reference structure of the PRIO-Grid cell raster, we check for autocorrelation between the selected variables during the period 1998-2007 in order to reduce the risk of unintentionally giving some factors more weight than others. Not surprisingly, there is a very strong and significant correlation between population size and population density (.905***). Therefore, the former is removed from the index. Child malnutrition is also strongly and significantly correlated with the percentage of the population which never went to school (-.500***). Thus, child malnutrition is dropped from the risk index since schooling data are available at a higher spatial resolution and infant mortality can also be interpreted as a proxy for access to daily necessities. Finally, a strong and significant correlation (-.523***) between the indicators deviation from an *xconst* value of

four and agricultural population is detected. Since both indicators refer to very different theoretical concepts and empirical measurements, we decide to use both indicators for the index and multiply each of them by 0.5. In order to account for double counting, we also multiply the indicators population density and political instability/past conflict with 0.5 since they are used as indicators for both vulnerability and general conflict risk. All social, economic and political indicators are lagged by one year in order to avoid endogeneity problems. Exceptions to this rule are the indicators for political instability (which already refers to the previous year) and education (since data on the population which never went to school are only available for one year).

Twelve indicators remain that are used for the risk analysis (see Table 3 for an overview). In order to integrate them into combined indices, for each variable the relevant data for 2008 is sorted by value and the 306 grid cells are divided into nine equal-sized quantiles.[20] The score of 9 always indicates the rank corresponding to the highest risk (strong exposure, high vulnerability, high general violent conflict risk), while the score of 8 characterizes the second-highest rank, and so on. For each grid cell these scores are then added up (specific variables weighted with 0.5 as described before) to calculate values for the three key concepts, which are then combined in order to produce the composite risk index (CRI). Such a procedure produces relative rather than absolute risk scores and is generally considered to be a suitable way to integrate different datasets in a comprehensible way (Busby et al. 2013; Rustad et al. 2011).

[20] When there is little variation within the data, we utilize natural breaks. In case of national-level data, we divide all countries on which data are available into 18 quantiles (in order to account for very strong international differences) to define national scores for Kenya and Uganda. Cells which experienced violent conflict in 2007 are scored 7, while those who were not are scored 3. See Appendix II for more details.

Component	Indicators	Operationalization	Data source	Resolution	Remarks	Contribution to CRI
exposure to climate change	higher temperature	av. 2008 – av. 2007	Tollefsen et al. (2012)	grid cell		16.7%
	reduced precipitation	av. (2004-2008) – av.(1979-2008), divided through av.(1979-2008)	Tollefsen et al. (2012)	grid cell		16.7%
vulnerability to climate change	education	% of population never went to school (2002/2009)	KOD (2009); UBOS (2006)	district/ county		7.4%
	health	infant mortality rate (2007)	DHS Program (2013)	DHS region	t-1	7.4%
	population density	persons/km² (2007)	Tollefsen et al. (2012)	grid cell	t-1; * 0.5	3.7%
	political instability	conflict occurrence in previous year (i.e. 2007)	Raleigh et al. (2010)	grid cell	* 0.5	3.7%
	environmental dependence	% of population active in agriculture (2007)	FAO (2013)	national	t-1; * 0.5	3.7%
	soil degradation	rate of soil degradation (1990)	ISRIC (1990)	ISRIC polygon		7.4%
general risk of violent conflict onset	GDP growth	annual GDP growth (2007)	World Bank (2013a)	national	t-1	13.3%
	medium level of democracy	deviation from *xconst* value of 4 (2007)	Marshall et al. (2012)	national	t-1; * 0.5	6.7%
	population density	persons/km² (2007)	Tollefsen et al. (2012)	grid cell	t-1; * 0.5	6.7%
	past conflict	conflict occurrence in previous year (i.e. 2007)	Raleigh et al. (2010)	grid cell	* 0.5	6.7%

Table 3: Indicators and datasets included into the risk analysis for 2008
Explanation: av. = average; t-1 = lagged by one year; * 0.5 = divided through two in order to account for double counting or autocorrelation

3.3.3 Results

Figures 4-6 show the spatial distribution of the individual indicators constituting the risk components, while Figure 7 shows the integrated maps for each risk component: exposure to climate change, vulnerability to climate change and general violent conflict onset. Higher mean temperatures in Western Kenya as well as Eastern and Northern Uganda can be contrasted with significant precipitation reductions in Southern Kenya, parts of Central Kenya and around the Ugandan shore of Lake Victoria (Figure 4). When combining both indicators, one can detect a particularly high exposure to adverse climate change in South-western Kenya, while North-eastern Kenya and South-western Uganda are hardly affected (Figure 7a).

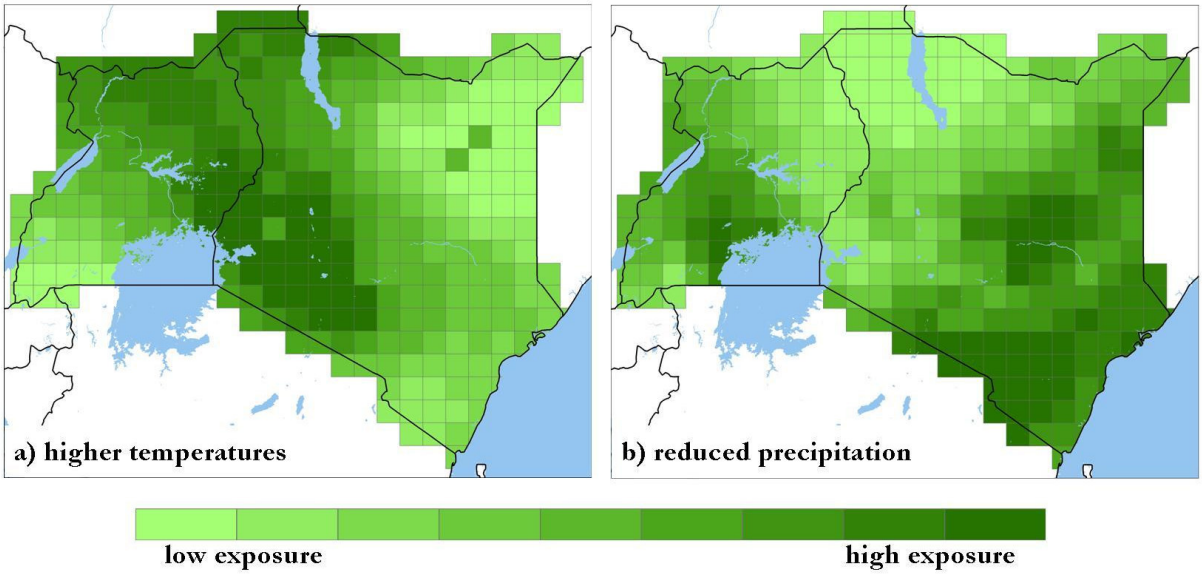

Figure 4: Components of the exposure to climate change index

Regarding the six indicators for vulnerability to climate change (Figure 5), we see that Uganda in general is characterized by a higher population density and a more critical health situation (Figures 5b and 5d). By contrast, national-level differences are less important than sub-national variation for the indicators measuring education, political instability and soil degradation (Figures 5a, 5c and 5f). Environmental dependence is the only indicator for which national-level data are used. However, since the percentage of population working in agriculture is very similar in both countries (Kenya: 33.38%; Uganda: 33.44%), they receive the same score in risk analysis (Figure 5e). We combine all indicators and find Uganda to be much more vulnerable to climate change than Kenya (Figure 7b). But there are important sub-national variations. The most vulnerable areas are located in North-eastern and South-western Uganda as well as around the Kenyan shore of Lake Victoria. The least vulnerable areas are found in Central Kenya (especially in the south) and in parts of Central Uganda.

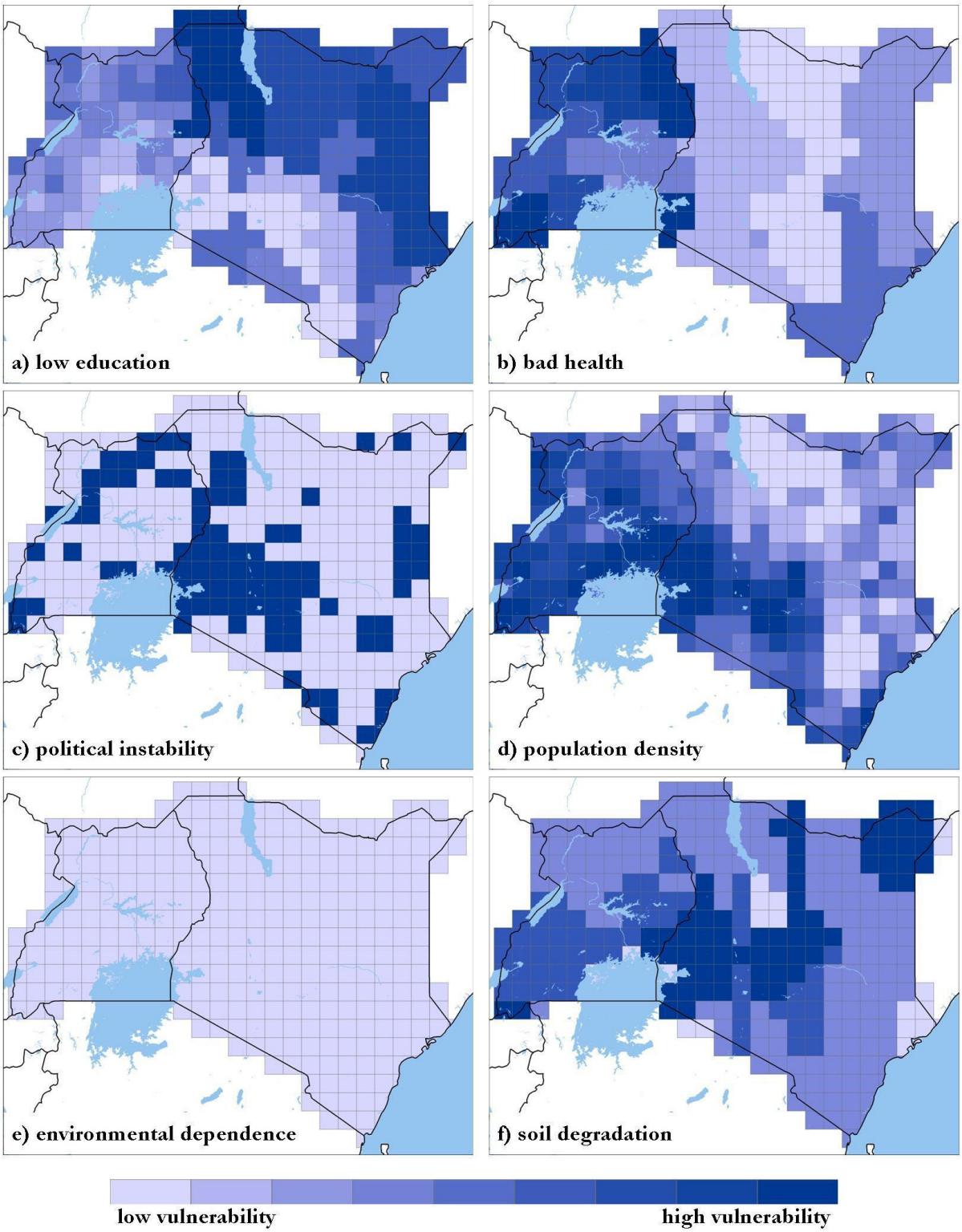

Figure 5: Components of the vulnerability to climate change index

The general risk of violent conflict onset contains four indicators (Figure 6), two of which utilize national-level data. Both of these indicators (GDP growth and level of democracy) identify Uganda as more prone to violent conflict onset (Figures 6a and 6b), as does the population density indicator (Figure 6c). It is thus not surprising to see that Uganda has a much higher risk

level when combining all four indicators. However, there are high-risk areas in Western and South-eastern Kenya as well (Figure 7c).

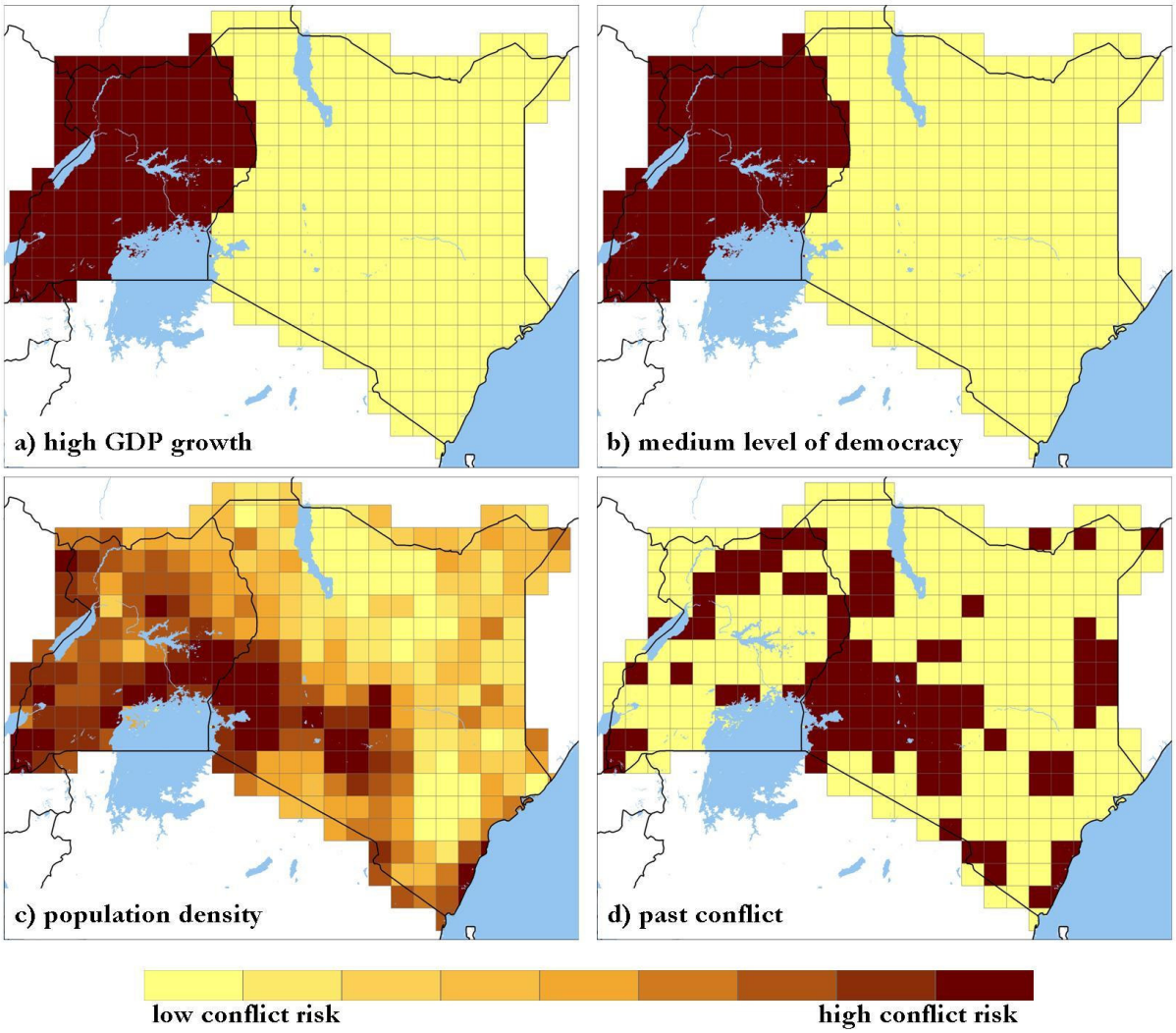

Figure 6: Components of the general risk of violent conflict onset index

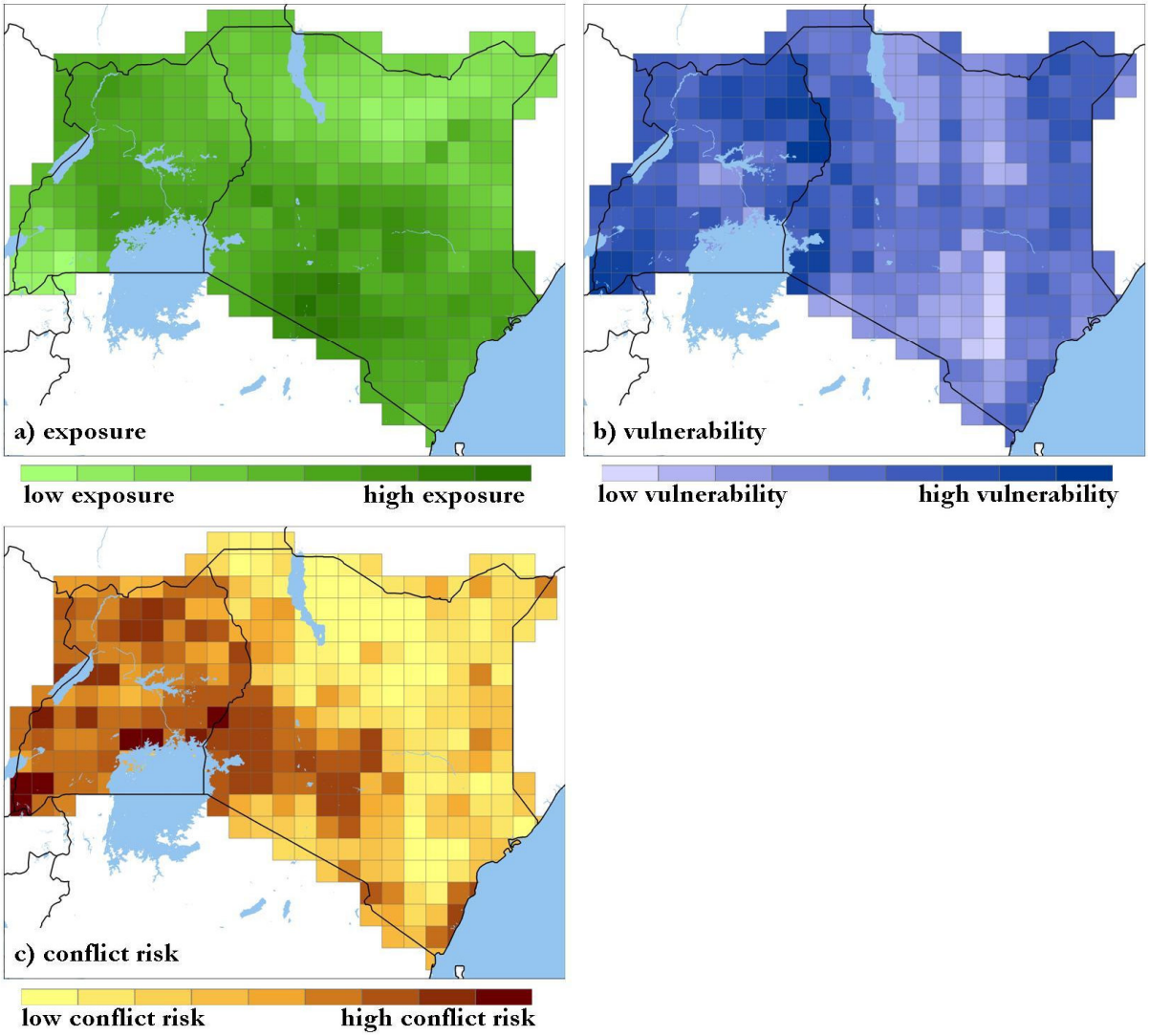

Figure 7: Components of the composite risk index (CRI)

As discussed above, a possible link between climate change and violent conflict is most likely to occur in areas characterized by high exposure to climate change, high vulnerability to climate change and high violent conflict risk scores simultaneously. In the next step, the three main components are therefore integrated into various versions of a composite risk index (CRI) (Figure 8). We produce four specifications of the CRI. First, all three components are weighted equally (Figure 8a). Second, the importance of the exposure component is doubled vis-à-vis the vulnerability and conflict risk components (Figure 8b). This specification is in line with positions claiming a strong link between climate change and violent conflict onset (e.g. Burke et al. 2009; Hsiang et al. 2013). In a third specification, the vulnerability basket receives 50% of the weightage, while exposure and conflict risk are each allocated 25% (Figure 8c). This priorization is supported by several studies finding sensitivity levels and adaptive capacities to be crucial in determining human reactions to environmental and climate stress (e.g. Bogale/Korf 2007; Ngaruiya 2014). Finally, several authors argue that if at all, climate change is only a very minor

factor in stimulating violent conflict when compared to socio-economic and political variables (e.g. Dixon 2009; Salehyan 2008). We thus create a specification doubling the weightage of the conflict risk component (Figure 8d).

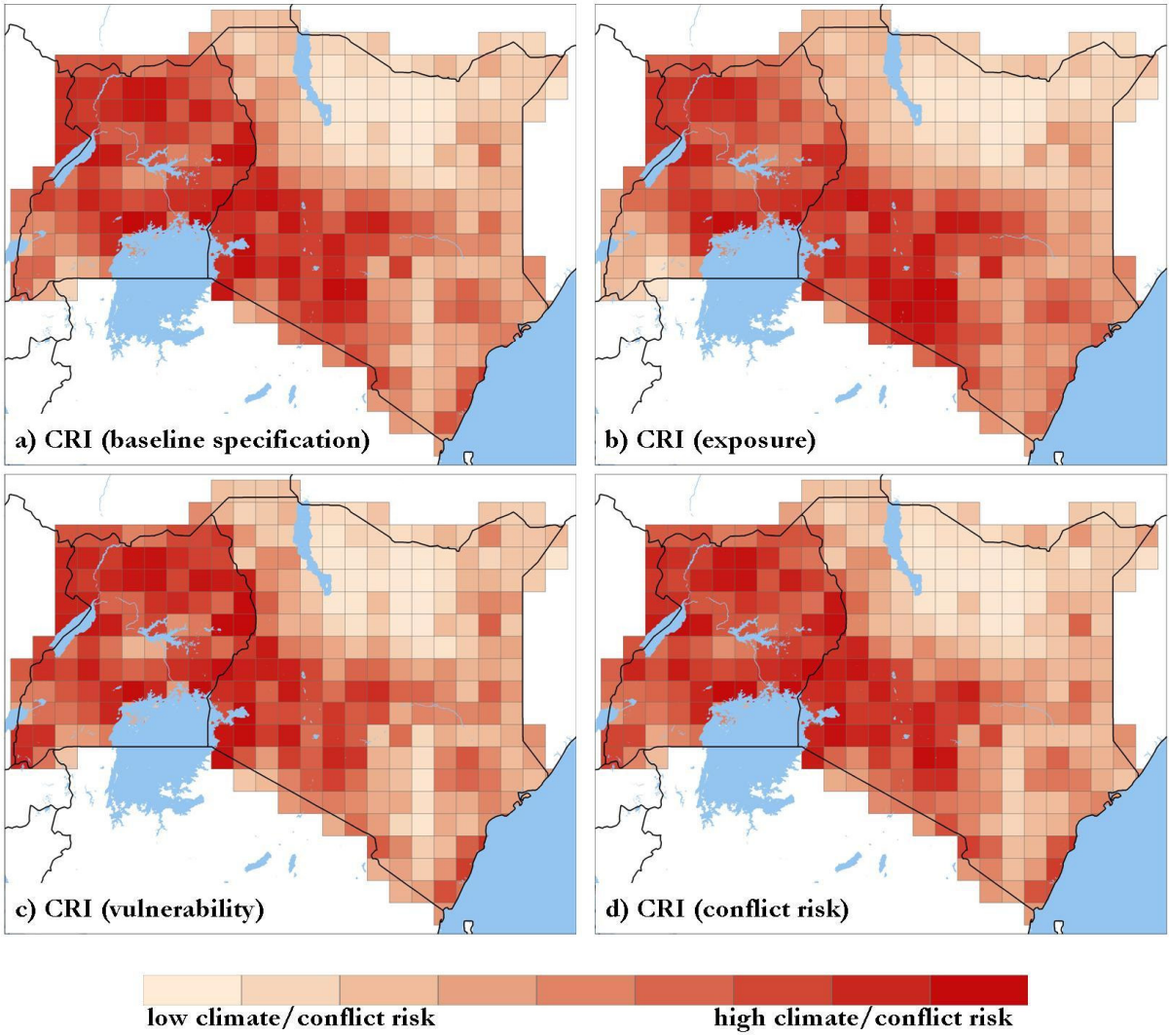

Figure 8: Composite risk index for 2008
The three components (exposure, vulnerability, conflict risk) are either weighted equally (a) or the weightage of one component is doubled (b-d)

We start our discussion with the specification that gives equal weight to all three main components (Figure 8a). It identifies large parts of Uganda, with the exception of South-western and parts of Central Uganda, as high-risk areas in 2008. The same applies for the South-western quarter and the southern shoreline of Kenya. By contrast, the sum of the exposure, vulnerability and conflict risk scores is low in Northern Kenya, parts of South-eastern Kenya and South-western Uganda in 2008, thus indicating a low risk for climate change-related violence.

This version of the risk index is robust to changes in the specification procedure and is therefore called baseline specification henceforth. When comparing it to the other specifications mapped in

Figure 8, one can identify only three regions which are evaluated differently by the various versions of the risk index. South-western Uganda is considered a low to medium risk area by Figure 8a (components weighted equally) and 8d (giving conflict risk more weight). But the same region is described as a low risk area by Figure 8b (giving exposure more weight) and as a high risk area by Figure 8c (giving vulnerability more weight). North-eastern Uganda is portrayed as a high risk area by Figure 8a, 8c and 8d, but as a medium risk area Figure 8b. Finally, central Southern Kenya is a high risk area according to Figure 8a, considered as a very high risk area by Figure 8b, and regarded as a medium risk area by Figure 8c and 8d. The case studies below discuss two of these areas in greater detail.

Finally, Figure 9 compares the baseline specification (Figure 9a) with a version of the risk index from which all national-level data is removed (Figure 9b). Thus, the specification represented by Figure 9b does also exclude economic growth as an indicator for general violent conflict risk. The use of this indicator is supported by the results of our correlation analysis (Table 2), but not by most of the literature on the issue. When only sub-national data are used, the differences between Kenya and Uganda are reduced. Nevertheless, a strong national difference remains and both specifications of the index identify the same high- and low-risk areas. This shows that the on average higher risk scores for Ugandan cells are not primarily driven by national-level data in general or the contestable economic growth indicator in particular.

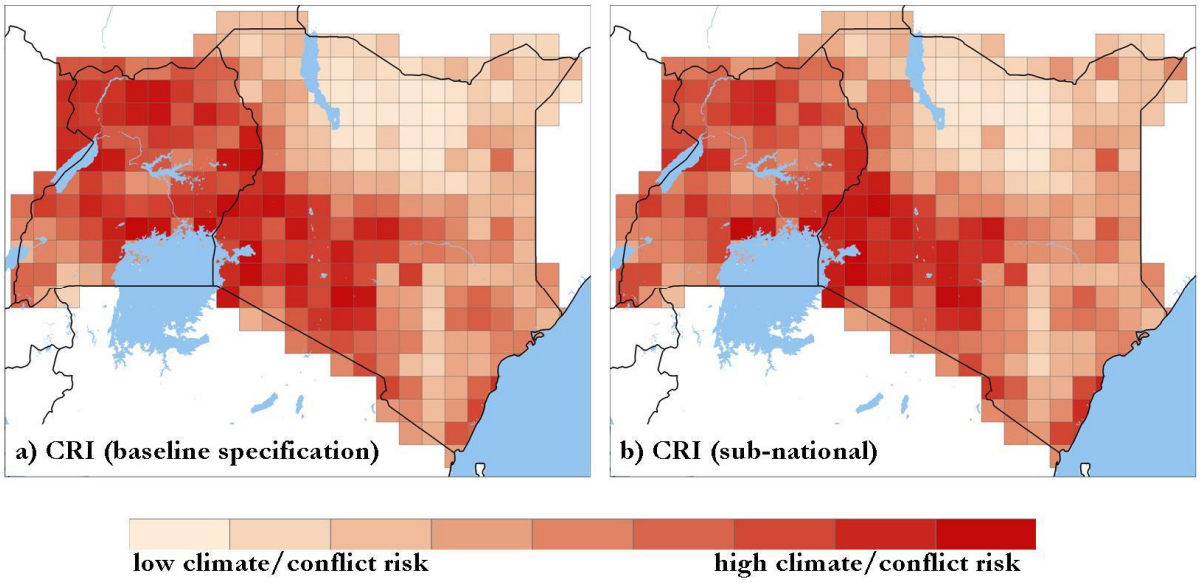

Figure 9: Composite risk index for 2008 with and without national-level indicators

3.4 Evaluation of the composite risk index

In this section, we evaluate the findings of the CRI (baseline specification) by contrasting it with conflict data and case studies available for 2008. In a first step, the correlations between the CRI

and four different violent conflict datasets are presented. However, these conflict datasets neither tell us whether the events they register are (possibly) related to climate change, nor do they enable the verification of the individual components/indicators and datasets used. Therefore, in a second step the results of the risk analysis are compared with the findings of three case studies.

3.4.1 Quantitative evidence

Table 4 shows the correlations between the baseline specification of the CRI and various measurements of violent conflict in 2008. Besides the general ACLED dataset, which collects low- as well as high-intensity political conflict events (Raleigh et al. 2010), we use three datasets. We create a subset of ACLED containing only the category "violence against civilians" (ACLED-VAC) to limit the sample to small-scale events which are considered as more likely to be influenced by climate change (Melander/Sundberg 2011). For the same reasons, we include the SCAD dataset, which also includes social conflict events below the threshold of civil war (Hendrix/Salehyan 2012). Finally, the UCDP-GED dataset (Sundberg/Melander 2013) is utilized despite its relatively high inclusion threshold because most studies on a possible climate-conflict link use the UCDP datasets (Scheffran et al. 2014). Each of the four datasets is used to create a binary variable for the occurrence or non-occurrence of a violent conflict event for each grid cell in the year 2008.

Variable	ACLED	ACLED-VAC	SCAD	UCDP-GED
exposure	.159***	.140**	.135**	.045
vulnerability	.213***	.160***	.056	.192***
conflict risk	.0406***	.323***	.199***	.173***
CRI (baseline specification)	.358***	.290***	.194***	.177***

Table 4: Correlation between the CRI (baseline specification)/ its components and violent conflict occurrence in 2008
*** = $p < 0.01$; ** = $p < 0.05$; N = 306

The results of the correlation analysis presented in Table 4 provide some support for the CRI. Not surprisingly, the strongest correlation exists between the conflict risk component and the various measures of violent conflict occurrence. However, the exposure and vulnerability components are also positively and significantly correlated with three of the four conflict variables. But the most important finding is the positive and robust correlation between the baseline specification of the risk index and the various conflict measures. It has to be said, however, that the sample size is rather small (n = 306) and that none of the datasets used distinguishes between conflicts related to climate change (or environmental issues in general) and other kinds of conflicts. This limits the explanatory power of the statistical analysis.

Figure 10 visualizes the relationship between the CRI and the occurrence of violent conflict. It partially confirms the results of the statistical analysis. The usefulness of SCAD is limited in this context since it only captures very few instances of violent conflict in Kenya and Uganda during 2008. Similarly, UCDP-GED, due to its high inclusion threshold, does not capture minor instances of violent conflict (e.g. at the north-western shore of Lake Victoria). There is considerable overlap between the areas with a high composite risk score and the occurrences of violent conflict in 2008 according to the ACLED datasets, although several mismatches exist. This does not imply that any of these conflict events have actually been related to climate change. However, it is interesting to note that many of the conflict events registered by ACLED (and the other datasets) in the dark red areas of Western Kenya (Figure 10) were instances of post-electoral violence or did involve a local militia, the Sabaot Land Defence Force. The larger conflict dynamics which feed these events were political (including elite manipulation). But land scarcity played an important role as well (Simiyu 2008) and the related stress may have increased with lower agricultural yields due to higher temperatures and reduced precipitation. Future case studies should investigate the possible links between climate change and violent conflict in this area in 2008 in greater detail.

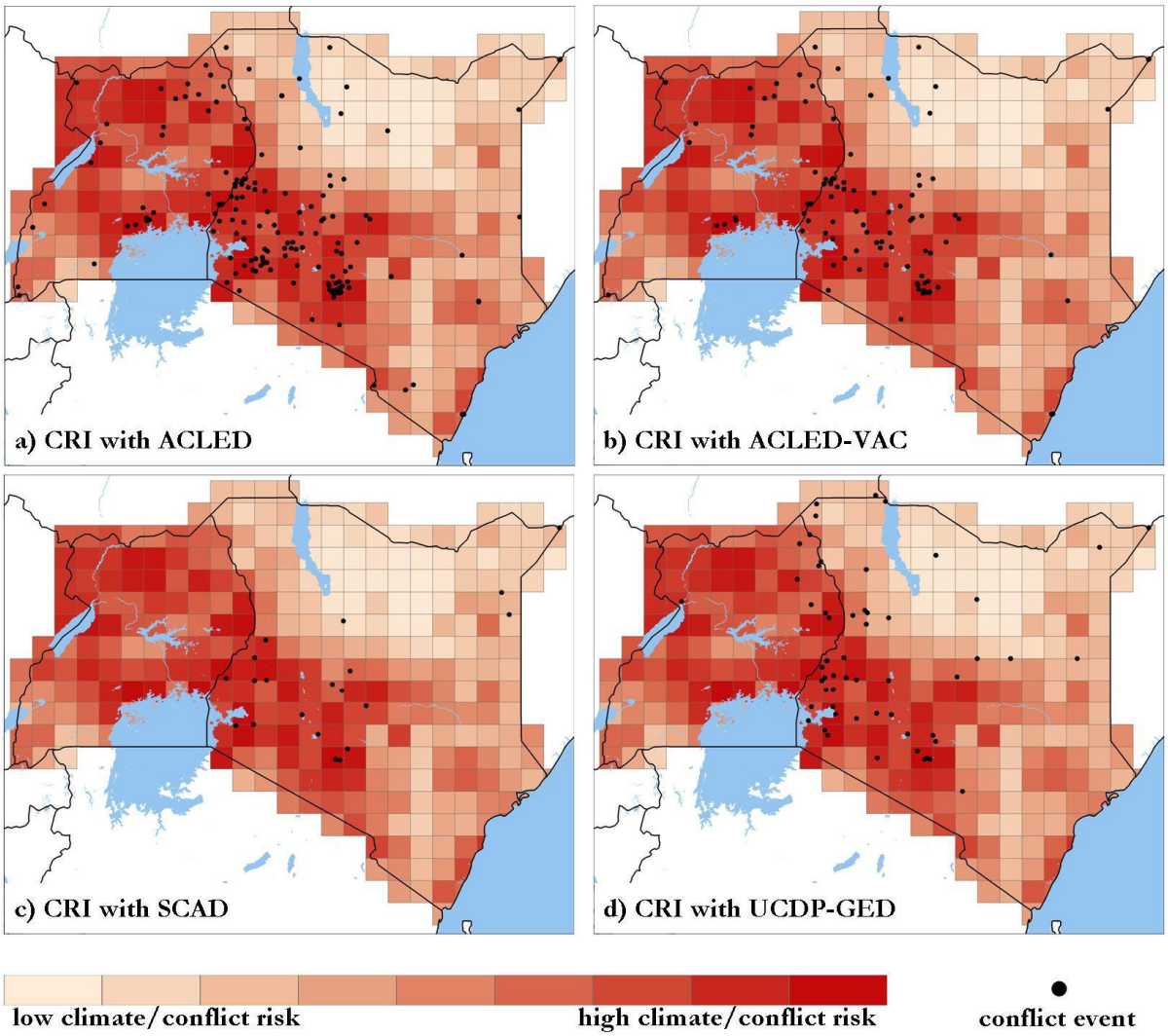

Figure 10: Comparison of the composite risk index (baseline specification) with four conflict datasets for 2008

3.4.2 Case study evidence

In our context, case studies are a helpful testing strategy since they can evaluate the findings of the risk index and its individual components in greater depth. We choose three case studies by applying the diverse case technique (Gerring/Seawright 2007: 97-101), i.e. we select three quite different regions with respect to their size, location and assessment by the CRI and its components (see Figure 11 and Appendix III). Two of three regions (Loitoktok and Karamoja) are evaluated differently by the various specifications of the CRI (Figure 8). The Loitoktok and Southern Turkana-Pokot North case studies are based on key stakeholder interviews and focus group discussions the authors conducted during field research in the respective regions. Data for the Karamoja case is collected through literature review.

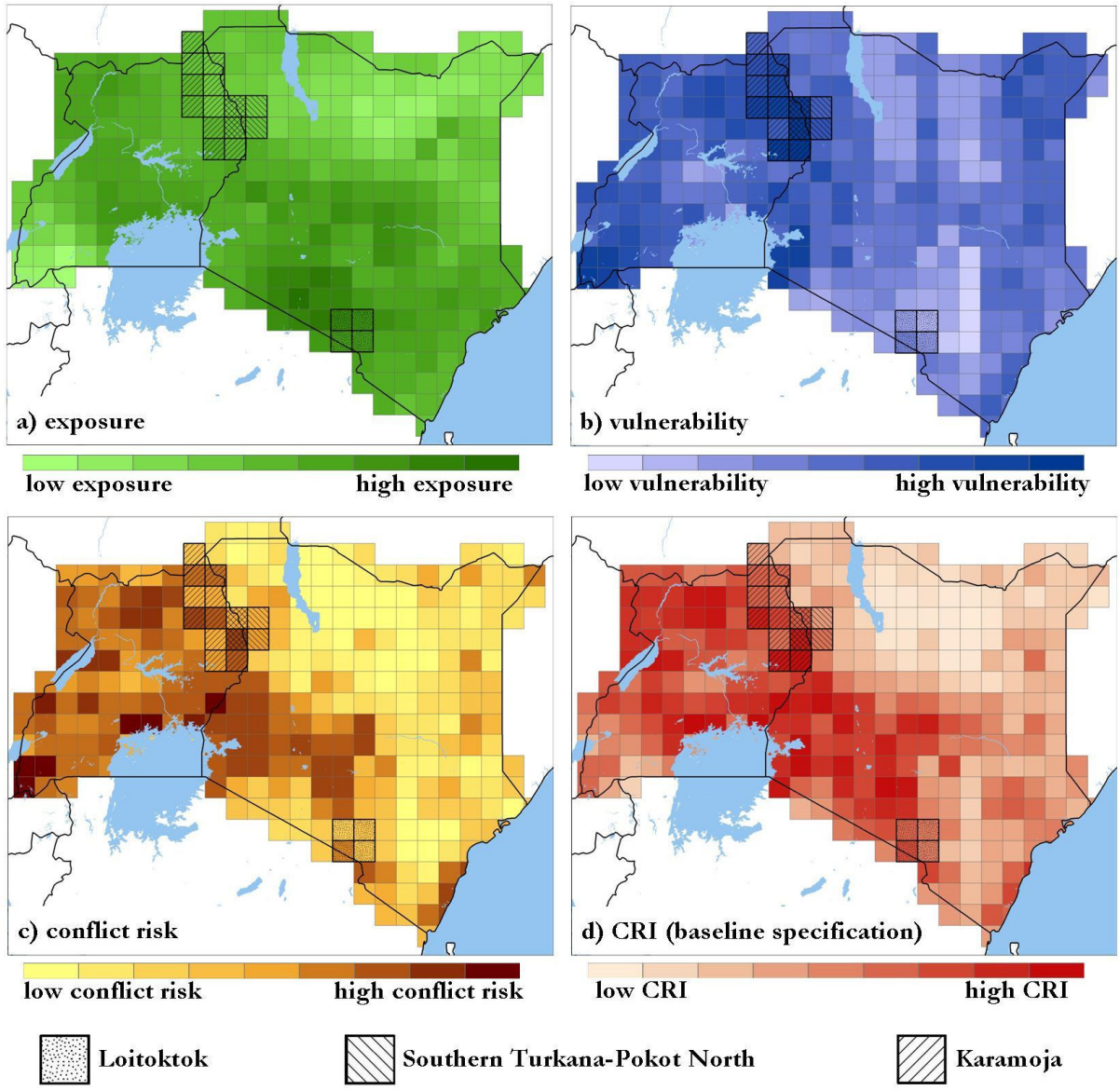

Figure 11: Case study areas and risk index for 2008

3.4.2.1 Loitoktok

Loitoktok is an arid to semi-arid district at the Kenyan side of the border with Tanzania. The main livelihoods in the area are agriculture (crops and livestock keeping) and tourism, both of which are particularly supported by water from Mount Kilimanjaro. According to the risk index, Loitoktok was characterized by a medium composite score of exposure, vulnerability and violent conflict risk, which would suggest a medium risk to experience violent conflict related to climate change in 2008 (Figure 11d). Field research, by contrast, suggests a rather low risk for the onset of such conflicts. While there are frequent human-wildlife conflicts in Loitoktok, the general level of inter-group violence is very low and conflicts around natural resources are managed by effective local conflict resolving mechanisms that promote all-inclusive participation (Ngaruiya 2014; Ngaruiya/Scheffran 2013).

The high exposure to climate change of Loitoktok suggested by the risk index (Figure 11a) is confirmed by case study evidence. Overall, the region has become dryer and slightly warmer in recent years (Ngaruiya/Scheffran 2013). One key evidence to support this diagnosis is the diminishing glaciers of Mount Kilimanjaro, which have shrunk by around 85% between 1912 and 2007 (Thompson et al. 2009).

In a similar manner, field research by one of the authors confirms the very low vulnerability diagnosed by the risk index for 2008 (Figure 11b). Health and education levels are relatively high, population density is below the Kenyan average (Government of Kenya 2009), and the Loitoktok agricultural sector boosts a well-linked functional social network structure that enables high information exchange and promotes diversified activities that cushion the community against drought effects (Ngaruiya 2014).

The general risk of violent conflict onset in Loitoktok in 2008 is considered to be medium by the risk index (Figure 11c). This stands in contrast to the results of recent field research which finds a low level of political instability and violent conflict in the area. This low conflict risk can be attributed to economic development and associated construction of a new tarmac highway that opened up the region to trade with subsequent increase in settlement zones and financial institutions, and the dense and cohesive social network structure that enhances conflict resolution mechanisms in Loitoktok (Ngaruiya 2014). Apparently, these network structures are not adequately reflected by the risk index. In addition, the binary past violent conflict measure, which registers a single political clash between supporters of two rival parties during heightened election fever in 2007, seems not sufficient to capture the tradition of peaceful conflict resolution in the area. This highlights the importance of cultural and institutional conditions of conflict resolution.

Overall, the risk index seems to describe exposure and vulnerability of Loitoktok to climate change correctly. However, it overrates the composite risk because it overestimates the general violent conflict onset risk and attributes too much weight to the exposure component vis-à-vis the vulnerability component. The specification of the CRI giving more weight to the vulnerability indicators (Figure 8c) thus seems to draw a more accurate picture of Loitoktok in 2008.

3.4.2.2 Southern Turkana-Pokot North

The study area in Southern Turkana and Pokot North lies at the intersection of four grid cells. Especially the Turkana side of the region is characterized by an arid climate and high levels of political and economical marginalization. Turkana is the poorest county in Kenya (Government of Kenya 2007). The main livelihood for the Turkana is pastoralism, while the Pokot practice some agriculture in addition to pastoralism. Violent livestock raids, especially between the Turkana and the Pokot but also between other pastoral groups, as well as the availability of small

arms make the region highly insecure (e.g. Eaton 2008; Eriksen/Lind 2009). Previous studies (Eriksen/Lind 2009; Mkutu 2006) and field research conducted by one of the authors suggest a strong relation between climatic conditions, resource availability (especially water and pasture) and the occurrence of violence. Against this background, one would expect the area to appear as dark red in Figure 11d. However, Southern Turkana-Pokot North is only classified as a medium risk area by the CRI (baseline specification).

Figure 11a shows that Southern Turkana-Pokot North is classified as hardly exposed to adverse climate change. This is mostly driven by a positive trend in precipitation diagnosed by the satellite-based PRIO-Grid data. This stands in strong contrast to the local perception of the Pokot and especially Turkana communities, who reported an increase in drought frequency and duration as well as increased rainfall variability and unpredictability (Schilling 2012; Schilling et al. 2014).

The level of vulnerability varies within the region (Figure 11b). The two western cells of the case study region show a very high level of vulnerability, while the two eastern cells are characterized by medium vulnerability. The west-east difference is among other factors due to the western cells belonging to Uganda. When the western cells are attributed to Kenya, their vulnerability is reduced to a medium level as well. Field research suggests that on the one hand, the local communities and their pastoral lifestyle are well adapted to the harsh climatic conditions. But the strong dependence on water, land and pasture makes pastoralism very sensitive to climate change on the other hand (Schilling 2012). The practice of commercial cattle raiding aggravates this situation because stolen cattle is increasingly sold to non-local actors, resulting in a outflow of cattle resources from the region, particularly on the Pokot side (Eaton 2010; Schilling et al. 2012). The risk index adequately captures this duality in a medium to high level of vulnerability.

The high level of violent conflict and instability that was prevalent in the region in 2008 and the previous years is only partially reflected by Figure 11c. This can be explained by the two national-level measures used to operationalize the general risk for violent conflict component, which both identify Uganda as more prone to violent conflict onset than Kenya. Even more important, the binary past conflict variable derived from ACLED is unlikely to adequately represent the high levels of violence prevalent in the region. This would not change much if one uses the number of conflicts rather than a binary conflict measure since ACLED only registers nine conflict events for the area in 2007 (while SCAD registers no conflict event), which is still far below the number of violence incidents field research would suggest (CEWARN 2010; Ember et al. 2012; Schilling et al. 2012).

In summary, the risk index underestimates the conflict risk and especially exposure to climate change of Southern Turkana-Pokot North. According to field research, the region suffers from

high exposure, medium vulnerability and high violent conflict risk simultaneously. One would therefore consider the region as a very-likely case for the occurrence of climate-change related violent conflict in 2008. This is not adequately reflected by the medium risk score of the CRI.

3.4.2.3 Karamoja

The Karamoja sub-region is located in the North-eastern part of Uganda and covers twelve grid cells. The region is arid to semi-arid and marked by low levels of annual rainfall. Large parts of the population rely on pastoralism to sustain their livelihoods. The region is described by the CRI (baseline specification) as a high risk area (Figure 11d). The existing literature and databases on the region support this impression. CEWARN (2010), for instance, registers 210 incidents of pastoralist conflict with 203 fatalities in 2008 for the Ugandan Karamoja cluster. Local histories of violence and political instrumentalization are crucial to understand such incidents (Eaton 2008), but these occur quite often around temperature- and precipitation-sensitive natural resources like water or pasture. Cattle raids are frequently used to restock herds after droughts (Bevan 2008; FEWS NET 2005; Inselman 2004).

Nevertheless, support of qualitative data for the CRI does not necessarily imply support for each of its three components. The risk index describes Karamoja as having experienced a low to medium exposure to climate change in 2008 (Figure 11a). This finding is driven by temperature as well as precipitation increases. Field researchers and local actors alike, however, report not only higher temperatures, but also less rainfall and more droughts in recent years (Stites et al. 2010; UNOCHA 2008). Thus, like in Southern Turkana-Pokot North, there is a considerable difference between satellite data on and local actors' perceptions of precipitation changes.

The risk index further portrays Karamoja as very vulnerable to climate change (Figure 11b). This is confirmed by the literature, which considers the region to be "more vulnerable to the effects of climatic shocks, principally drought, than any other region of Uganda" (UNOCHA 2009: 2). Karamoja suffers from a high environmental dependence (Stites et al. 2010) as well as distressing levels of education, access to daily necessities and health (Bevan 2008; Powell 2010).

Finally, Karamoja is characterized by widespread, low-level violence (Jabs 2007). According to CEWARN (2010), for instance, there have been at least 512 incidents of pastoralist conflict causing 866 fatalities in the years 2007 and 2008. This stands in contrast to the medium to high general risk of violent conflict onset diagnosed by the risk index for 2008 (Figure 11c). As with Southern Turkana-Pokot North, it seems that the indicators used for the general conflict risk component do not adequately capture the state weakness and culture of violence prevalent in the region. ACLED, for instance, registers the occurrence of a violent conflict in 2007 in only half of the cells covering Karamoja, which is unlikely given the large amount of violent conflict events

described in the literature as well as by CEWARN (2010) for this year. Even worse, SCAD registers violent conflict events in none of these twelve cells in 2007.

In sum, the findings of the risk analysis and the qualitative literature largely agree regarding the vulnerability and composite risk for Karamoja. The exposure and general violent conflict onset risk, by contrast, are described as too low by the risk index. Therefore, the region should appear in an even darker red in Figure 11d. The specification of the CRI giving more weight to the vulnerability components (Figure 8c) seems to describe Karamoja better.

3.4.2.4 Discussion

The comparison with three case studies provides mixed support for the risk index. The baseline CRI's assessment of Karamoja in 2008 is largely supported by the case study. By contrast, the CRI overrates the risk for Loitoktok and clearly underestimates the risk for Southern Turkana-Pokot North.

Regarding the three components, there is agreement between the vulnerability assessments of the risk index and those of the case studies for all three cases. The risk index also correctly describes Loitoktok as highly exposed to climate change in 2008. For Southern Turkana-Pokot North and Karamoja, there is a mismatch between satellite data measuring precipitation increases and local inhabitants' perceptions of declining rainfalls. This finding is in line with the results of other studies (Murtinho et al. 2013; Ovuka/Lindqvist 2000). Possible explanations include limitations in the climate data (e.g. grid density) or a too strong focus on annual averages (Ovuka/Lindqvist 2000). It is also possible that temperature increases in recent years have put the dry land vegetation under severe stress so that even higher precipitation levels are insufficient to prevent drought-like conditions on the ground (Ziervogel et al. 2008: 19). Such gaps between satellite measurements and local perceptions provide severe challenges for quantitative studies investigating the links between precipitation and conflict patterns. This is the case for efforts to generate risk indices and maps, but also for regression analyses (e.g. Fjelde/von Uexkull 2012; Hendrix/Salehyan 2012; Theisen et al. 2012).

Although the general risk of violent conflict component is based on a regression analysis of the drivers of violent conflict in the time period 1998-2007, it overestimates the conflict risk of Loitoktok and underestimates the conflict risk of Southern Turkana-Pokot North and Karamoja in 2008. One explanation for this is the inability of the past conflict indicator to adequately capture institutionalized structures of cooperation (as in Loitoktok) or violent competition (as in Karamoja and Southern Turkana-Pokot North). This might even be the case for the available geo-referenced datasets of small scale conflicts in general since they have problems to adequately capture instances of violence in peripheral areas (chapter 2).

3.5 Conclusion

This study argues that if a link between climate change and violent conflict exists, it is most likely to occur in areas experiencing simultaneously a high exposure to climate change, a high vulnerability to climate change, and a high general risk of violent conflict onset. We assessed the spatial distribution of these factors at a resolution of 0.5° in Kenya and Uganda in 2008 and integrated them into various specifications of a composite risk index (CRI). A quantitative evaluation supported the findings of this analysis, while the comparison of the CRI with three case studies yielded mixed results and identified important issues for future large-N studies on climate change and violent conflict.

In the introduction, we discussed three ways in which our multi-method analysis contributes to the existing literature. First, it can be a helpful tool for policy makers, development workers and security analysts who try to cope with the societal impacts of climate change (and violent conflict), although it is inherently difficult to predict future violent conflict events (Schneider et al. 2010). Second, our analysis supports researchers in identifying relevant areas for in-depth case studies. The example of violence in Western Kenya (and especially in Mount Elgon) in 2008 has already been mentioned in section 4.1. Several most-likely and most-unlikely cases as well as mismatches (high composite risk scores but no actual conflict onset or vice versa) can be identified from Figures 7, 8 and especially Figure 10, too. Finally, our analysis enables the "ground check" of large spatial datasets (and related theories). Examples of this include the limits of satellite-based precipitation and geo-referenced past conflict data (see section 4.2). Equally important is the lack of comprehensive data on local networks and institutions, which were found to be highly important in shaping resilience to climate stress and violent conflict. In Loitoktok, for instance, cohesive social network structures and the availability of widely accepted conflict resolution mechanisms are key to understand the low vulnerability and low general violent conflict risk of the local communities (Ngaruiya 2014). This is in line with the recent findings of other researchers, which consider the availability and legitimacy of conflict resolution mechanisms as crucial for conflict prevention and inclusive natural resource management (Benjaminsen/Ba 2009; Bogale/Korf 2007). Local political and economic developments that are connected to the national level, such as the commercialization of cattle raiding in Southern Turkana-Pokot North or the political instrumentalization of pre-existing tensions in Karamoja, are equally important but not yet sufficiently captured in by existing datasets, too. Advances regarding these data issues would strengthen regression analyes on the climate-conflict link as well as other efforts to map climate risk (Busby et al. 2013) or environmental conflict (Bocchi et al. 2006) hotspots.

Finally, the empirical adjustment of a risk index is a never ending process. As soon as finer-grained theories, new empirical evidence or improved datasets enter the stage, they can be used to improve and specify the CRI. It is also possible and desirable to conduct such a risk analysis with projection data for future scenarios as well as for other parts of Africa and the world.

4 Why do conflicts over scarce renewable resources turn violent? A Qualitative Comparative Analysis

4.1 Introduction

The possible role of scarce, renewable resources such as water or land for intra-state violent conflict onset has received great scholarly attention since at least the 1990s (Bächler 1998; Homer-Dixon/Blitt 1998c). In recent years, this research has been related to and picked up by a growing literature on climate change and conflict (e.g. Scheffran et al. 2012c; Theisen et al. 2013). The role of renewable resources in violent conflict onset is not only discussed by scientists, but by policy makers as well. US Secretary of State John Kerry, for instance, recently expressed his concern about the issue: "If we don't respond adequately to the challenge of global climate change over the course of these next years there will be people fighting wars over water and over land" (U.S. Department of State 2013).

Research on the possible links between natural renewable resources and conflict has been conducted in a range of disciplines, including geography, political science, sociology and anthropology. But despite considerable research efforts, no scientific consensus on the issue has emerged as yet. Some quantitative studies suggest a link between low precipitation levels (Fjelde/von Uexkull 2012; Raleigh/Kniveton 2012) or freshwater scarcity (Gizelis/Wooden 2010; Raleigh/Urdal 2007) and intra-state violent conflict, while others cannot find a significant correlation between these two variables (O'Loughlin et al. 2012; Salehyan/Hendrix 2014; Wischnath/Buhaug 2014). The same is true for quantitative studies on soil degradation (Hendrix/Glaser 2007; Raleigh/Urdal 2007; Rowhani et al. 2011; Theisen 2008) and deforestation (Esty et al. 1999; Theisen 2008). The findings of qualitative studies are similarly ambivalent. Some authors claim a role for renewable resource scarcity as a cause of violent conflict in certain cases (Nyong et al. 2006; Schilling et al. 2012), some scholars reject such a link (Adano et al. 2012; Selby/Hoffmann 2014), and some provide mixed results (Benjaminsen/Ba 2009; de Châtel 2014).

In order to advance our knowledge about the links between renewable resource scarcity and intra-state violent conflict, scholars have repeatedly emphasized three tasks for future research. First, according to Barnett (2000), scholars have convincingly argued how resource scarcity causes grievances, livelihood insecurities and conflicts, but we do hardly know how, when and why such tense situations escalate into open violence. Similarly, Engels/Chojnacki (2012: 94) claim that "the transition from conflict to violence has not yet been analyzed in a sufficiently sophisticated manner in the literature on "environmental conflicts"."

Second, the inconsistent results of previous studies reported above suggest that renewable resource scarcity is linked to violent conflict only under specific circumstances. This claim is nowadays shared by nearly all authors in the research field (Homer-Dixon/Blitt 1998c; Scheffran et al. 2012c). "It is important to ask, therefore, why violence [related to scarce resources] occurs in some places and not in others" (Peluso/Watts 2001: 29). Recently, quantitative studies have tried to address this problem by introducing interaction terms between some independent variables, such as reduced precipitation, political exclusion and economic marginalization (Fjelde/von Uexkull 2012; Theisen et al. 2012). However, the number of interactions terms that can be used in a statistical regression is limited (Vis 2012). Case studies, by contrast, are able to consider complex interactions between different variables, but often suffer from a lack of generalizability and comparability.

This relates to a third, more general point. The methods most widely used in the research on renewable resource scarcity and violent conflicts are so far either large-N regression analyses or qualitative single-case studies. The latter have repeatedly been criticized for their inability to generalize their findings (Gleditsch/Urdal 2002; Koubi et al. 2014; Meierding 2013), although case studies are principally able to produce generalizable results (Flyvbjerg 2006). But the shortcomings of large-N regressions have been pointed out as well. Besides their limited ability to include interaction terms and non-linear effects (Sterzel et al. 2014), they cannot include important variables on which quantitative datasets either do not exist (e.g. resource distribution) or are hard to produce (e.g. identities, traditional conflict resolution mechanisms) (Cramer 2002; Selby/Hoffmann 2014). Other datasets have only a low spatial resolution, usually the national level, or are criticized for their low reliability (de Juan 2012; Koubi et al. 2014; Weidmann 2013). As a consequence, calls have been launched to explore middle ways between single-case and large-N studies which combine the strengths of both approaches (Meierding 2013; Scheffran et al. 2012c; Solow 2013).

All three suggestions widely discussed in the literature on renewable resource scarcity and violent conflict are picked up by this study. In order to do so, it utilizes the rich case-study literature on renewable resource scarcity and conflict. Twenty cases of intergroup conflict around land, water, fish or forest resources are identified, seven of which escalated into open violence, while 13 remained largely non-violent. The twenty cases are compared in a systematic manner with the help of the Qualitative Comparative Analysis (QCA) technique/approach in order to detect the conditions under which conflicts around scarce renewable resources turn violent. QCA is well suited to deal with complex causal relationships and to uncover relevant background conditions and interaction effects. Since cases are selected from a variety of locations and contexts, the results are much more generalizable than single-case studies. However, the analysis is still

essentially based on the in-depth, qualitative knowledge of the twenty cases under study. In this sense, the QCA provides a middle ground between quantitative large-N and qualitative case studies.

This chapter proceeds as follows. In the next section, the theoretical background of the study is developed and the hypotheses are formulated (2). Afterwards, the research design (3) as well as the results and several robustness checks (4) are presented. In the following discussion, the results are interpreted in theoretical terms and illustrated by an example (5). Finally, a conclusion is drawn (6).

4.2 Theoretical background

In this study, a conflict is defined as a manifest clash of the interests of two or more social groups. Violence refers to the use of direct, physical force against human beings. And renewable resource scarcity describes a situation in which the land, water, fish or forest resources in a given area are insufficient to satisfy current human demands for these resources. Such scarcity can be supply-induced, demand-induced, and/or structural (induced by unequal distribution) (Homer-Dixon/Blitt 1998c: 6). But under what conditions do conflicts around such scarce resources turn violent? Albeit not without objections (Selby/Hoffmann 2014), previous research largely agrees that violent conflicts around scarce renewable resources are most likely to occur in relatively poor countries (often termed global south or non-OECD world), and there especially in rural and peripheral areas where the state's capacity is limited (Homer-Dixon/Blitt 1998c; Scheffran et al. 2012c; WBGU 2008). These factors are used to demarcate the "area of homogeneity" of this study, which makes sure that the cases selected are similar enough to compare them in a meaningful way (Berg-Schlosser/de Meur 2009: 20f.). But poverty and peripheral location are not suitable for distinguishing cases of violent conflict from cases of non-violent conflict about scarce renewable resources, since both conditions are quite prevalent.

In general, the number of conditions (roughly equal to independent variables) that can be included into a QCA is limited. The number of logical remainders, which potentially decrease the reliability of the results, grows with every additional condition used (see below). For a QCA with twenty cases, it is recommended to keep the number of conditions between three and five (Berg-Schlosser/de Meur 2009; Marx/Dusa 2011). Based on this recommendation, four conditions are proposed as explanatory factors. These were selected in accordance with the theoretical literature, but also in a dialogue with the case selected (Schneider/Wagemann 2012: 281). Only such

conditions can be chosen on which reliable and location-specific information are available for all (potential) cases under study.[21]

Firstly, authors adopting a political ecology perspective have emphasized the links between global capitalism, resource appropriation and violent disputes (e.g. Peluso/Watts 2001; Robbins 2004: 9-16). Some authors argue that commercialization, understood as the increasing exchange of natural resources on markets rather than within systems of reciprocity and subsistence, is an important factor for violent escalation of conflicts over scarce renewable resources. Increasing commercialization might create funds to buy weapons and raises incentives to control the respective resources, if necessary by means of violence (Le Billon 2001; Yeh 2000). Commercialization can also exclude underprivileged groups from accessing renewable resources in sufficient quality and quantity due to high prices, thereby increasing existing grievances up to a level where violence is used (Assies 2003). Other scholars use the concept of privatization, defined as the transformation of a resource from an open access or common pool to a private good. This might either raise grievances by those who are now excluded from using the resource, and thus resort to violent means, or is accompanied by violence used by the "privatizers" in order to enforce their claims (Jewitt 2008; Simmons et al. 2007). Finally, there are cases in which quite similar effects are produced by state interventions aimed at conservation or national development. Important examples are natural parks (Duffy 2002) or state-led water re-distribution (Lynch 2012). Since only a limited number of conditions can be used in a QCA, we follow the suggestion of Schneider/Wagemann (2012: 277) to create "master or macro-variables". The concepts of commercialization, privatization and state intervention are combined into the condition of external resource appropriation. This can be defined as the appropriation of renewable resources by actors which are external to the local context in which the conflict parties interact (e.g. transnational companies, national governments, urban consumers) and which do not use these resource for subsistence purposes. The first hypothesis of this study is therefore:

H_1: The external appropriation of renewable resources increases the risk for conflicts around these resources to escalate into violence.

Secondly, the importance of collective identities for the development of conflicts and especially for the use of violence by conflict parties is well known (Fröhlich 2012; Kaufman 2006). Identities can be understood as collective social constructs which define who are the members of a given social group, what attributes and goals they share, and how they relate to other groups (Abdelal et al. 2006). The delineation from other groups ("othering") can facilitate the use of violence if the respective Other is portrayed in negative terms (Chatterjee 2012; Hansen 2006).

[21] Several relevant conditions, such as the availability of arms (Schilling et al. 2012) or state weakness (Bächler 1998), can therefore not be included into the analysis. Only low-resolution national-level or unreliable and hardly comparable sub-national data are available for them.

The concrete forms of negative Othering are of course time and place specific. But it has been shown that the construction of another group (a) as an aggressor or existential threat to the Self and/or (b) as much lower in value/legitimacy than the Self usually provides motivation and legitimacy for the use of violence in intergroup conflicts (e.g. Bar-Tal 1998; Buzan et al. 1998; Kaufman 2006). When conditions of resource scarcity and perceived aggressive intentions by other groups combine, they potentially produce a strong climate of insecurity in which preliminary attacks to capture resources or weaken the opponent are likely to happen (Kahl 2006: 46f.; Scheffran et al. 2014). If other groups are conceived as having a low status or legitimacy, the inhibition threshold to use violent means in order to prevent these Others from using/acquiring renewable resources recedes (Martin 2005). On this basis, my second hypothesis is:

H_2: Negative othering between the groups in conflict over scarce renewable resources increases the risk for these conflicts to turn violent.

Thirdly, there is a large consensus about the importance of regime change for the eruption of civil war (Dixon 2009). This might be the case because regime change is already the result of a severe (violent) conflict. But it is also possible that regime change provides opportunities (e.g. low state capability to enforce law and order) or motivations (e.g. resistance against the new regime's policies) for the use of violence. These arguments are also valid for conflicts around scarce natural resources (Timura 2001). However, the focus on regime change alone might be too narrow. Changes of major elements of the political system (which are not always accompanied by regime change) can also have escalating effects on conflicts about renewable resources. The re-drawing of administrative boundaries, for instance, might have an escalating effect on conflicts around land or water resources in areas contested between different groups (Kahl 2006). Changes of policies related to renewable resources, such as water privatization, can have similar consequences (Assies 2003). Therefore, the concept of political change is used in this study. Political change is defined as a modification of (a) the characteristics of the political system and/or its spatial organization, and/or (b) the laws or policies related to the disputed renewable resources. The third hypothesis of this study is therefore:

H_{3a}: Recent political change increases the risk for a violent escalation of conflicts over scarce renewable resources.

However, this hypothesis might be misleading. Some forms of political change, such as the introduction of more constitutional rights, the strengthening of property regimes or the democratization of resource management, might mitigate the use of violence in resource conflicts (Ratner et al. 2013). I thus formulate an alternative version of the third hypothesis:

H_{3b}: Recent political change decreases the risk for a violent escalation of conflicts over scarce renewable resources.

Fourthly, power has often been identified as an important yet understudied factor in conflicts around scarce renewable resources (Houdret 2012; Selby/Hoffmann 2014). In this context,

Zeitoun (2008: 26-29) distinguishes between three dimensions of power: hard power, relational power, and ideational power. While the latter is crucial for the occurrence or non-occurrence of a conflict and therefore of minor relevance here, the first two dimensions of power are important in shaping the dynamics of conflicts around scarce resources. Hard power is understood as "the material capacity of one party to gain the compliance of the others" (Zeitoun 2008: 26) and includes material wealth as well as the capability to apply direct, physical violence. Relational power refers to the power one group derives from its authority and legitimacy. Concrete manifestations of this power include judicial backing, support from outside actors, media attention, recognition by the international community or issue linkage. But it is still unclear how (hard and relational) power differences shape the escalation of conflicts. Research on international wars has concluded that large and stable power asymmetries reduce the risk of the violent escalation of interstate conflicts, mainly because the weaker party is usually willing to concede in order to avoid open confrontation (Bennett/Stam 2004). In principle, this argument should hold true for intra-state conflicts around renewable resources as well. One the other hand, some studies suggest that large power differences increase the risk for conflicts around natural resources to turn violent because the stronger party has to fear neither considerable resistance nor sanctions when applying physical force (Simmons et al. 2007; Watts 2004). Consequentially, two alternative versions of the fourth hypothesis are considered:

H_{4a}: Large power differences between the parties in conflict over scarce renewable resources decrease the risk of a violent escalation.

H_{4b}: Large power differences between the parties in conflict over scarce renewable resources increase the risk of a violent escalation.

4.3 Research design

4.3.1 QCA in a nutshell

QCA was developed in the 1980s in order to compare causal patterns among a medium number of cases in a systematic way (Ragin 1987). More specifically, QCA aims at identifying necessary and sufficient conditions for a certain outcome. In order to do so, it applies a set-theoretic perspective (Schneider/Wagemann 2012), i.e. it analyzes whether given sets of cases stand in a subset-relationship or superset-relationship to each other. Regarding the chapter at hand, the question is then whether the set of cases in which conflicts over scarce renewable resources turn violent is a subset (indicating necessity) or a superset (indicating sufficiency) of one of the (combination of) conditions discussed in section 2, or if no set relations can be detected (indicating the absence of causal relationships).

When comparing cases, QCA obliges researchers to decide for each case whether it belongs to the set of cases sharing a certain condition (e.g. experiencing violence, being characterized by high power differences) or not (calibration). The more recent variant of fuzzy-set Qualitative Comparative Analysis (fsQCA) allows researchers to go beyond simple in-out (1 or 0) dichotomies and callibrate cases as having a partial membership (e.g. 0.4) in a set (Ragin 2009). However, the qualitative threshold of 0.5, distinguishing between cases which are more in than out of a certain set and vice versa, remains important (Schneider/Wagemann 2010). All cases can therefore be thought of as combinations of different conditions, such as being a member of set A (condition A is present), but not of B and C (conditions B and C are not present) or being a member of set A and B, but not of C. All possible combinations of conditions are listed in a so-called truth table. Each of the cases investigated can be assigned to one (and only one) combination of conditions (called a truth table row), while often some possible combinations (called logical remainders) are not covered by real cases. The number of truth table rows, and thus the number of logical remainders, grows exponentially with the number of conditions included. In general, a high number of logical remainders indicates that the impact of many combinations of conditions is not evaluated by drawing on empirical evidence and thus reduces the reliability of the results (Schneider/Wagemann 2012: 151-157)

Hug (2013) has recently argued that QCA scholars often do not account for possible measurement errors during the calibration process However, the fact that the calibration of the membership scores is usually based on an in-depth knowledge of the cases under consideration strongly reduces the number of measurement errors (de Meur et al. 2009). Robustness checks of the results also reduce the impact of possible measurement errors (see Skaaning 2011 and section 4). Once the cases are calibrated, one can check which combinations of conditions are linked to the outcome of interest, and these combinations/truth table lines are minimized in order to achieve the so-called solution formula or solution term. The solution formula/term indicates the (combinations of) conditions which are sufficient for the outcome of interest (Ragin 2009; Schneider/Wagemann 2012).

QCA is therefore based on three key assumptions (Schneider/Wagemann 2012: 78). *Equifinality* means that the same phenomenon can be explained by different, mutually non-exclusive sets of conditions. *Conjunctural causation* refers to the possibility that a certain condition has no effect on the outcome on its own, but only in combination with other conditions. Of particular relevance in this regard are so-called INUS conditions. An INUS-condition "is an insufficient but necessary part of a condition which is itself unnecessary but sufficient" for the outcome under investigation (Schneider/Wagemann 2012: 79). Both assumptions resonate very well with recent calls to pay more attention to the complex causal chains, involving interaction effects, which might cause

conflicts around scarce renewable resource to turn violent. Finally, *causal asymmetry* implies that the (combination of) conditions causing a certain outcome (here: violent escalation) are not necessarily a mirror image of those conditions causing the absence of this outcome. This is in line with the widely shared sentiment in peace and conflict research that violent conflict and non-violence/cooperation/peace cannot be treated as simple binary oppositions (Chenoweth/Cunningham 2013).

4.3.2 Case selection

The selection of cases is driven by several criteria. First, all cases are supposed to be characterized by a conflict around scarce renewable resources, since the key question of this study is under which conditions such conflicts turn violent. Second, cases have to be part of the area of homogeneity, so the conflicts should have taken place in peripheral, rural areas of countries in the global south. Third, since conflict patterns during the Cold War era might differ significantly from post-Cold War conflict dynamics, a temporal dimension is added to the homogeneity space: The study is limited to conflicts which took place after 1989. Similarly, only intra-state conflicts are considered because violent inter-state conflicts about renewable resources are very unlikely (chapter 2). Fourth, when using QCA, it is important the maximize variation of the causal conditions and the outcome under investigation in order to produce robust results (Berg-Schlosser/de Meur 2009; Schneider/Wagemann 2012: 151-160). The cases selected thus vary in terms of external resource appropriation, negative othering, recent political change, power differences between the conflict parties, and the degree of violent escalation. Fifth, in order to increase the generalizability of the results, conflict cases are chosen which

- took place during different time periods (between 1990 and 2010),
- took place in different geographical locations (Asia, Africa, Latin America, Middle East, and the Pacific),
- took place at various spatial scales (ranging from village to federal state level), and
- involved different kinds of renewable resources (land, water, fish, forest).

Sixth, the analysis only includes cases on which sufficient and reliable information is available. This implies that the cases are discussed by several studies from different authors, that the various studies and authors agree in their description of the cases, and that at least parts of this literature should be peer-reviewed. One should note that this prerequisite potentially reduces the generalizability of the results due to research or publication biases. Seventh, I consider only cases which are representative of their region. In other words: If a conflict over scare renewable resources became violent in one village, but not in the surrounding villages which are characterized by similar conditions, then this conflict is not used in the analysis.

When taking all seven criteria into account, a sample of twenty cases of conflicts over scarce renewable resources can be derived from the rich qualitative literature on socio-environmental conflicts. Figure 12 summarizes the sample of these cases and contains information about their location and time period as well as on the degree of violent escalation and the resources disputed. Appendices IV and V contain more information on all twenty conflicts, including short descriptions and a full list of references for each case.

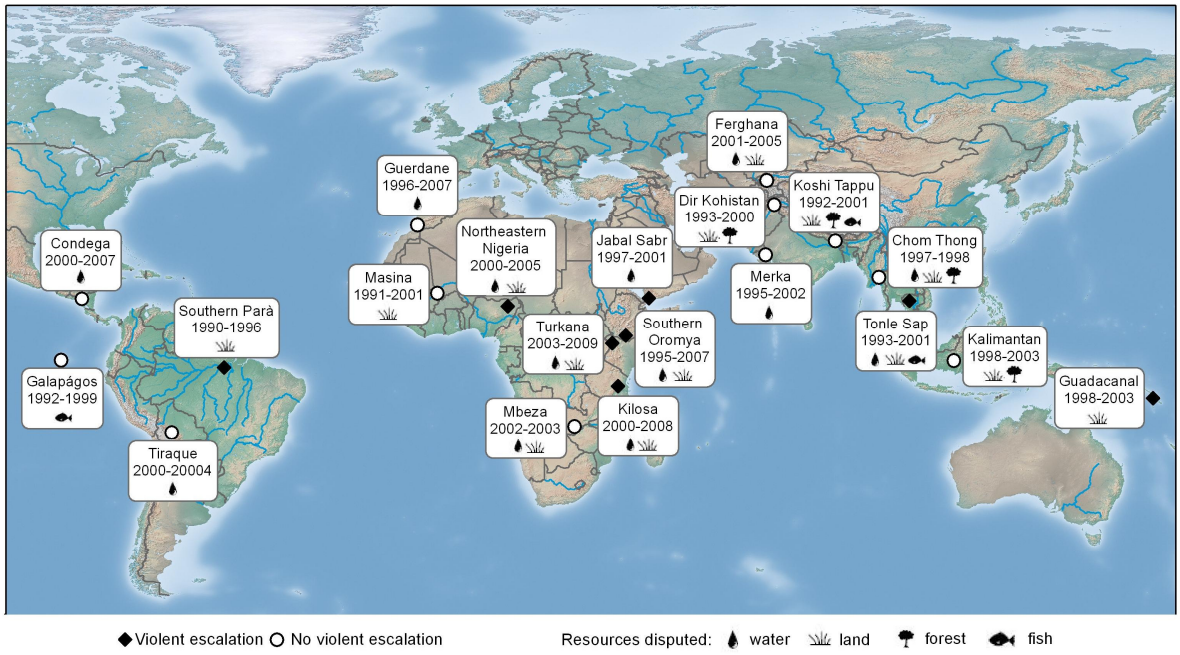

Figure 12: Sample of cases analyzed

4.3.3 Calibration

As discussed above, it is important that the calibration process is based on a good knowledge of the cases and on clearly defined thresholds between the different set membership scores (Schneider/Wagemann 2012: 32). In order to gain an in-depth knowledge, desk-based studies of the twenty cases selected are conducted. Existing studies on the conflicts about scarce renewable resources are used and complemented by more general publications on the relevant countries/regions. The Polity IV index (Marshall et al. 2012) is also consulted when membership scores for recent political change are assigned. If I was unsure about a specific calibration decision, I contacted experts on the conflicts or regions under investigation to provide additional insights (see acknowledgements). In appendix V, I provide short descriptions of all cases and justifications for all calibration decisions.

This study uses a four-value threshold scheme. Membership scores for the conditions and outcomes can be calibrated as 0 (fully out of the set), 0.33 (more out than in), 0.67 (more in than

out) and 1 (fully in). Such as scheme "is especially useful in situations where researchers have a substantial amount of information about cases, but the nature of the evidence is not identical across cases" (Ragin 2009: 90). It allows for capturing the diversity of social reality beyond 1-0 dichotomies, but does no contain too many values which would make proper calibration of qualitative case studies unreliable (Ragin 2009). In the following section, information about the qualitative anchors (full non-membership, full membership, cross-over point between membership and non-membership) and the graded membership definitions used in the calibration procedure are provided (Schneider/Wagemann 2012: 32, 277).

- Violent escalation: A case is considered as completely non-violent (0) if no or hardly any direct, physical violence was used and no fatalities are reported. If such violence was used sporadically and unsystematically, but caused at least one fatality, the case is calibrated with 0.33. The "point of maximum indifference" (Schneider/Wagemann 2012: 32) is passed when violence was used frequently by at least one conflict party and caused several fatalities, although the majority of conflict actions were still non-violent (0.67). If direct, physical violence was used not only frequently, but also in a systematic manner by at least one conflict party, the case is calibrated as fully violent (1).
- External resource appropriation: A case is calibrated as being fully out of the set (0) when no or hardly any external appropriation of the disputed renewable resource occurred. If there was some external resource appropriation, but it only marginally influenced the livelihood patterns and strategies of the groups in conflict, the case received a membership score of 0.33. The degree of external resource appropriation and the strength of its impact on local livelihoods are key factors determining the crossing of the important 0.5 threshold. If a significant amount of the renewable resource was appropriated by outsiders, in turn strongly influencing the livelihoods of the groups in conflict, the case is considered as more out than in (0.67). Full membership (1) is assigned if access of the groups to the renewable resource was severely restricted or completely denied.
- Negative othering: If no parties involved in the conflict over scarce renewable resources perceived its opponent(s) as an existential threat or as vastly inferior, the membership score for negative othering is set 0. If only a minority of the parties perceived its opponent(s) in such a way, the case was calibrated as 0.33. The point of maximum indifference is passed when the majority of the conflict parties share perceptions of existential threat and/or strong inferiority (0.67). A case is considered as a full member of the set of cases characterized by negative othering if all or the large majority of groups perceived it's Others as an existential threat or as vastly inferior.

- Political change: A case is considered to be fully out of the set of cases which experienced recent political change if neither its political system nor the regime concerning the renewable resource disputed has changed in the last (approximately five) years (0). If minor changes happened in the last years, a membership score of 0.33 is assigned. The difference between minor and major political changes is crucial in determining whether a case passed the 0.5 threshold. A change is considered minor if it affects secondary characteristics of the political system (e.g. electoral thresholds) or the resource regime (e.g. documentary procedures for obtaining land titles) and major if it affects defining characteristics of the political system (e.g. shift from autocracy to democracy) or resource regime (e.g. legalization of the sale of communal land). A case is calibrated as 0.67 if either the political system or the renewable resource regime experienced major changes in the last (approximately five) years. Full membership is assigned if major changes in both the political system and the resource regime took place (1). If a political change took place on paper or on the national level, but was not implemented in the region under investigation, set membership is calibrated as if no political change happened.
- Power differences: If all parties involved in the conflict had an equal amount of hard and relational power at their disposal, the case was considered as fully out of the set (0). A set membership score of 0.33 is assigned if one group was more powerful with regard to one dimension of power, but this advantage was largely "balanced" by an advantage of the other group or an equilibrium between both groups with regard to the other dimension of power. The point of maximum indifference is crossed if one group commanded more hard or relational power and the other groups were not able to compensate this by advantages (or at least equivalence) regarding the other dimension of power (0.67). If one group had a considerable advantage in terms of both hard and relational power, the case is considered as a full member of the power differences set (1).

4.4 Results[22]

In the first step, it should be analyzed whether there is any necessary condition for the outcome (Ragin 2009). The most important factor is assessing necessity in the consistency value, which indicates the degree to which a condition leads to the outcome across the cases. It is good practice to consider only those conditions as necessary which have a consistency value of 0.9 or higher (Schneider/Wagemann 2012: 278). In this study, neither the presence nor the absence of any of the four conditions discussed in section 2 passes this threshold. The presence of negative

[22] Replication data for the analysis presented in this section, including the truth table, the data matrix for the main analysis and all data used in the robustness tests, can be found in Appendix VI.

othering (0.83), the absence of power differences (0.83) and the presence of political change (0.79) have the highest consistency values.

When applying the logical minimization procedure to the truth table rows in order to detect sufficient conditions, three solution terms can be produced. The conservative solution is only based on those truth table rows which correspond to empirically observed cases. The intermediate solution draws on all empirically observed truth table rows and those combinations of conditions which do not correspond to empirical cases (logical remainders), but which contribute to the parsimony of the solution terms and can be assumed to produce the outcome of interest (here: violent escalation) based on theoretical knowledge. Finally, the solution based on all empirically observed cases as well as all those truth table rows contributing to the parsimony of the solution term is called the parsimonious solution. The latter is usually considered as problematic since it can be based on truth table rows which are neither empirically observed nor in line with theoretical expectations (Schneider/Wagemann 2012: 151-177). Proponents of fsQCA consider the intermediate solution as superior (Ragin 2009: 111), while other scholars criticize the inclusion of non-observed cases and recommend relying on the conservative solution (de Meur et al. 2009).

In this study, the logical minimization only includes truth table rows backed by empirical cases which pass a raw consistency threshold of 0.8 (Ragin 2006). Five out of sixteen truth table rows remain as logical remainders. When these are included in the analysis, using the directional expectations spelled out in section 2[23], the intermediate and the conservative solution are exactly the same. The solution formula is depicted in Table 5.

[23] External resource appropriation and negative othering increase the risk of violent escalation of conflicts over scarce resources, no clear assumptions can be made for recent political change and power differences.

causal pathway	negaoth * ~powerdiff * politchang	negaoth * ~powerdiff * extappro
consistency	0.88	0.86
raw coverage	0.58	0.50
unique coverage	0.17	0.08
cases covered	Jabal Sabr, Northern Nigeria, Southern Oromiya, Turkana	Guadalcanal, Southern Oromiya
solution formula	negaoth * ~powerdiff * (politchang + extappro) -> violence	
solution consistency	0.89	
solution coverage	0.67	

Table 5: Conservative/intermediate solution for the violent escalation outcome

Legend: * = and
+ = or
~ = absence of
-> = sufficient for

The solution formula can be read as follows: The combination of negative othering, the absence of power differences between the conflict parties, and either recent political change or external resource appropriation is a sufficient condition for the violent escalation of conflicts over renewable resources. The solution is characterized by a high consistency value (0.89) and can explain five out of seven cases of violent escalation. Only Southern Pará and Tonle Sap remain unexplained and are discussed in greater detail below. In addition, none of the thirteen cases without violent escalations is characterized by this combination of conditions (although this statement should be treated with caution due to QCA's assumption of causal asymmetry).

Finally, in recognition of QCA's assumption of causal asymmetry (Schneider/Wagemann 2010), the absence of the outcome is investigated. No necessary condition for conflicts over scarce, renewable resources to remain non-violent can be found. Regarding sufficiency, I use a consistency threshold of 0.8 to include truth table rows into the logical minimization and the directional expectations discussed in section 2 and footnote 1. The resulting conservative solution is quite complex and its theoretical interpretation would go beyond the scope of this chapter.[24] The intermediate solution considers the absence of negative othering in combination with either large power differences or recent political change as sufficient for a conflict about scare renewable resource to be carried out non-violently (consistency: 0.9; coverage: 0.72):

~negaoth * (politchang + powerdiff) -> ~violence

Before the results are discussed in the subsequent section, their robustness should be tested with a focus on the sufficient conditions for violent escalation. In general, fsQCA is considered as a quite robust method due to the researcher's deep knowledge of the cases analyzed (de Meur et al.

[24] The conservative solution (consistency 0.9; coverage: 0.72) is: ~negaoth * (powerdiff * ~politchang + ~powerdiff * politchang + powerdiff * extappro + politchang * extappro) -> violence.

2009) and because the consistency values of the truth table rows are based on evidence from all cases analyzed (Ragin 2009: 119). Nevertheless, Schneider/Wagemann (2012: 284-295) and Skaaning (2011) emphasize the importance of checking the robustness of the results vis-à-vis changes in (a) the frequency thresholds, (b) the consistency thresholds, (c) the cases analyzed, (d) the conditions used, and (e) the calibration decisions. In an analysis with not more than twenty cases, any other frequency threshold than (at least) one (case per truth table row) is hard to justify (Ragin 2009: 107). The remainder of this section is used to perform the other four robustness checks.

Firstly, the consistency threshold for the inclusion of truth table rows in the minimization procedure (0.8 in the original analysis) can be changed. Lowering this threshold is not feasible since the next lowest consistency score of a truth table row is only 0.7, which is beyond the acceptable minimum threshold of 0.75 (Schneider/Wagemann 2010). If the analysis is run again with a higher threshold of 0.85, the solution formula for the conservative and the intermediate solution (consistency: 0.86; coverage: 0.5) is:

negaoth * ~powerdiff * politchang * ~extappro -> violence

The main difference to the original solution formula is that now, not the presence but the absence of external resource appropriation is part of the solution formula.

Secondly, the robustness of the results vis-à-vis a changing population of cases should be checked. One might argue that Guadalcanal differs from the other cases in which violence was used because the conflict escalated into a civil war and a coup d'état, both of which were clearly not solely driven by land scarcity (although due to the weak nature of the Solomon state, the small territorial size of the conflict and the forms of organized violence used, the dynamics of violence were similar to those in other cases, such as Turkana or Oromiya). It could also be claimed that in southern Pará, land was abundant, maldistributed and hardly accessible (given the poor road infrastructure) rather than scarce (although this argument would be based on a limited understanding of resource scarcity). Finally, one might recommend the dropping of the cases of Condega and Dir Kohistan since no article on them is published in peer-reviewed journals (although sufficient and reliable information on both cases are available from edited volumes, working papers and personal communication with experts). If I run the analysis again but drop those four cases, the number of logical remainders increases from five to seven. But the solution formula is quite similar and identical for the conservative and the intermediate solution (consistency: 0.87; coverage: 0.77):

negaoth * ~powerdiff * politchang -> violence

The only difference to the original solution formula is that external resource appropriation is no longer included. This change is driven by the removal of Guadalcanal from the analysis, since it is

the only case of violent escalation uniquely covered by the causal combination of negative othering, low power differences and external resource appropriation. This finding confirms doubts about the robustness of external resource appropriation as an INUS condition raised by the first robustness test.

Thirdly, a QCA with twenty cases can also be run with five instead of four conditions (Marx/Dusa 2011), although the number of logical remainders grows with the inclusion of each additional condition. Recent research has emphasized the importance of education for the prevention of violence over scarce renewable resources. Well-educated individuals can, for example, introduce technologies to use scarce resources more efficient or seek employment in the secondary/tertiary sector (Bretthauer 2014). Similarly, a low level of development is argued to facilitate the violent escalation of conflicts over scarce renewable resources (e.g. Homer-Dixon/Blitt 1998c; WBGU 2008). Since poverty and peripheral location constitute the homogeneity space of this study, all twenty cases were characterized by comparatively low levels of development. But one can nevertheless detect differences between the cases. I therefore run the analysis two additional times, once with education (edu) and once with low level of development (lowdev) as an additional condition. The percentage of the population which completed primary education is used as a proxy for education, while a high child (under-five) mortality rate indicates a low level of development. Sub-national (although not case-specific) data on both indicators are obtained from the Demographic and Health Survey Program (2013).[25]

For both analyses, the complex and the intermediate solution formula are identical. The solution formula (consistency: 0.87; coverage: 0.54) of the analysis including level of development is:

negaoth * ~powerdiff * politchang * lowdev -> violence

In accordance with the theoretical expectations, the presence of a low level of development facilitates the violent escalation of conflicts over scarce renewable resources. But more important is that negative othering, the absence of large power differences and recent political change are again highlighted as INUS conditions for violent escalation, while (the presence or absence of) external resource is not part of the solution formula.

Basically the same can be said for rerunning the analysis including the level of education, which results in the following solution term (consistency: 0.88; coverage: 0.58):

negaoth * ~powerdiff * politchang * ~edu -> violence

In line with theoretical expectations, the absence of high levels of education is an INUS condition, while the other three elements of the solution term remain unaltered.

[25] Set membership scores are calibrated based on natural gaps in the data. Child mortality: 0-49/1000 = 0; 50-99/1000 = 0.33; 100-149/1000 = 0.67; ≥150/1000 = 1. Primary education completed: 0-9% = 0; 10-19% = 0,33; 20-33% = 0.67; ≥34% = 1. Threshold for the inclusion of truth table rows in the logical minimization: 0.8.

Fourthly, the scope for setting alternative calibration thresholds is very limited if the calibration procedure is based on deep qualitative evaluations rather than on quantitative datasets. However, it might be argued that the recent political change condition mixes up two too different concepts, namely changes of the political system and changes of the resource regime. Therefore, the political change condition is divided into two crisp-set (binary calibrated) conditions: recent change of the political system (polsystchang) and recent change of the resource regime (resregchang). If the latter rather than political change is used in the analysis, the conservative (and simultaneously intermediate) solution formula (consistency 0.84, coverage: 0.67) is:

negaoth * ~powerdiff * (~resregchang + extappro) -> vio

The absence of recent changes in the resource regime is now part of the solution formula for the violent escalation of conflicts over renewable resources. This contradicts the results of the previous specifications, which all identify the presence of political change as an INUS condition for violent escalation. If one runs the analysis with the recent political system change condition, the conservative solution formula (consistency: 0.75, coverage: 0.75) looks different:

polsystchang * (~powerdiff + negaoth * extappro) -> vio

In line with nearly all specifications of the analysis presented above, recent changes of the political system turn out as an INUS condition for violent escalation. The consistency of this solution term is comparatively, although not unacceptably low (0.75). When re-running the analysis with a higher consistency threshold for the inclusion of truth table rows (>0.8), the resulting solution formula has a very high consistency (0.93), but a lower coverage (0.54), and is in line with what appears to be the most robust combination of INUS conditions in the various robustness tests:

negaoth * ~powerdiff * polsystchan -> vio

4.5 Discussion

In the light of the analysis presented, how can the six hypotheses discussed in section 2 be evaluated? From a strict linear, monocausal point of view, all hypothesis have to be rejected. Neither the presence nor the absence of external resource appropriation, negative othering, recent political change or power differences between the parties involved appeared as single necessary or sufficient conditions for the violent escalation of conflicts about scarce renewable resources. But if one accepts QCA's assumptions of conjunctural causation, equifinality and causal asymmetry, the picture changes considerably. The combination of negative othering, the absence of large power differences between the parties in conflict, and recent political change (especially of the political system) is a highly robust sufficient condition for the violent escalation of conflicts over scarce renewable resources.

This causal pathway explains four of the seven cases of violent escalation (Jabal Sabr, Northern Nigeria, Southern Oromiya, Turkana) and is absent in all thirteen conflicts not experiencing a violent escalation. The violent escalation of land conflicts on Guadalcanal in 1998 might also be considered as covered by this causal pathway, because although the Solomon Islands did not see a major change of the political system or the land regime between 1993 and 1998, it experienced four different governments, three governmental changes and tremendous political volatility in this period (Moore 2004). Therefore, only the cases of Southern Pará (violent escalation despite large power differences) and Tonle Sap (violent escalation despite large power differences and low negative othering) are not covered by the most robust solution formula. One might explain these outliers by the unique history of land conflict in northern Brazil (Simmons et al. 2007) and the legacy of the brutal civil war in Cambodia (Degen et al. 2000; Kiernan 2002), but more research on this issue is needed.

In theoretical terms, the robust solution term is in line with what we know from existing research in peace and conflict studies and might serve as a basis for developing a general theory of renewable resource scarcity and (violent) conflict. Strong power asymmetries are likely to discourage the use of violence in conflicts about scarce renewable resources because the weaker party will usually prefer a negotiated compromise over a physical or political defeat (Bennett/Stam 2004). Perceiving the Other as an existential threat makes preliminary attacks to capture resources or weaken the opponent more likely (Buzan et al. 1998; Scheffran et al. 2014), while constructing out-groups as inferior lowers the inhibition threshold for using violence in conflicts about renewable resources (Kaufman 2001; Martin 2005). But both conditions – absence of power differences and negative Othering – are largely static and invariant over time. They are important pre-conditions, but for conflicts about scarce renewable resources to turn violent, a "precipitating event" is often necessary (Hislope 2007: 154). Political changes provide opportunities (e.g. due to temporary state weakness) as well as incentives (e.g. resistance against these changes) to use violence and thus can act as precipitating events for violence, but only in the context of negative Othering and low power differences.

The example of Southern Oromiya from the mid-1990s to the mid-2000s is illustrative in this regard. This vast, semi-arid part of southern Ethiopia is inhabited by various pastoralist ethnic groups (e.g. Borana, Digodi, Guji) which frequently engage in (sometimes violent) conflicts with each other. As a consequence, relations between the various, equally powerful groups are tense and characterized by mistrust, fear and depreciation. The conflicts between the various pastoralist groups often concern water, land and cattle resources, which became increasingly scarce due to severe droughts in the 1980s. As a result, conflicts intensified and escalated in the 1990s along the lines of ethnic differences and historical grievances. But a major factor for the violent escalation

of these conflicts was the replacement of the communist Derg regime by a democratic and federalist political system between 1991 and 1994. Firstly, activities by the new government to commercialize agriculture in Southern Oromiya increased resource scarcity and access problems for pastoralists. Secondly, efforts by the state to increase its presence in peripheral lowlands led to a weakening of traditional conflict resolution mechanisms. And finally, the attempt to fix the boundaries between the territories of various ethnic groups ("ethnic federalism") caused increasing territorial conflicts between pastoral groups, particularly around key water points and grazing areas (Hagmann/Mulugeta 2008; Temesgen 2010).

4.6 Conclusion

This study took as a starting point three suggestions repeatedly articulated in the recent literature on environmental change, conflict and violence: focus on the transition from conflict to violence, take context factors seriously, and consider methodological middle grounds between quantitative large-N and qualitative case studies. Given the contradictory results previous quantitative and qualitative studies report on the link between resource scarcity and violence, it asked why some conflicts over scarce, renewable resource escalate into violence, while others do not. By conducting a QCA of twenty such conflicts, seven of which turned violent, it was found that the simultaneous presence of negative othering, the absence of large power differences and recent political change represents a sufficient condition for the violent escalation of conflicts over scarce renewable resources. Theoretically, one might conclude that negative othering and low power differences are important pre-conditions for such violent escalations, but that a precipitating event, namely political change, is necessary to trigger them. Speaking to the literature on socio-environmental conflicts and more recently on climate change and conflict, this implies that the scarcity of renewable resources causes violent intergroup conflicts, but only under specific circumstances.

Methodologically, I agree with other recent publications that QCA is a well-suited method for the growing research on socio-environmental conflicts (Basedau/Richter 2014; Bretthauer 2014). The results of a QCA are much more generalizable than the ones of single-case studies if cases are chosen in an appropriate manner and robustness tests are conducted. But QCA's are also based on in-depth knowledge of the cases under investigation and can account for complex causal relations, which is usually difficult for quantitative large-N studies (but see Braumoeller/Goertz 2003). The number of interaction terms which can be used in a regression analysis is limited (Vis 2012), and such studies rely on datasets that have recently been criticized for their inability to capture local realities adequately (Benjaminsen/Ba 2009; Selby/Hoffmann 2014; Simons/Zanker 2012). For instance, large-N analyses often use datasets on ethnic power relations as proxies for

political marginalization and the related grievances (Fjelde/von Uexkull 2012; Theisen et al. 2012). But there are cases in which ethnic heterogeneity and ethnic marginalization did not produce strong grievances (e.g. Chom Thong, Masina), while in other cases strong grievances occur in ethnically homogenous populations (e.g. Dir Kohistan, Jabal Sabr). The negative othering condition used in this study is well-suited to capture such variations in local grievances.

But as in any other field of research, QCA should be complemented by (just as it complements) other methods. With regard to the analysis presented above, it would be worthwhile for in-depth qualitative case studies to determine the factors which make Southern Pará and Tonle Sap outliers not explained by the solution formula. Similarly, large-N studies could focus on the interaction effect between renewable resource scarcity, negative othering, low power differences and recent political change discovered in this study, and check whether it can be generalized for a larger population. The relationship between environmental changes, resource scarcity, conflict and violence is complex, and we are well advised to study them with a method mix that can account for this complexity.

5 Towards a discursive understanding of socio-environmental conflicts: a theoretical framework and its application to the Israeli-Palestinian water conflict

5.1 Introduction

At least since the late 1990s, the detection of possible links between environmental degradation, renewable natural resource scarcity and various forms of conflict ranks high on the agendas of political geography, security studies and peace and conflict research (e.g. Benjaminsen 2008; Brauch 2009; Deligiannis 2012; Homer-Dixon 1994; Houdret 2012; Kahl 2006; Koubi et al. 2014; Wolf et al. 2003). Since 2007, these links have become a major point of contention in the debates on climate change and conflict (e.g. Ember et al. 2012; Feitelson et al. 2012; Fjelde/von Uexkull 2012; Hendrix/Salehyan 2012; Koubi et al. 2012; O'Loughlin et al. 2012; Salehyan 2008; Scheffran/Battaglini 2011; Theisen et al. 2013). While such conflicts are often termed environmental or, more recently, climate conflicts, I prefer the term "socio-environmental conflicts" (Nims 2005: 1), since it is both social and environmental factors that drive their dynamics. Despite much attention by policy makers and the large number of studies on the issue, the links between renewable resource scarcity/degradation and conflicts as well as the dynamics of socio-environmental conflicts are still poorly understood (e.g. Deligiannis 2012; Meierding 2013).

I suggest that there might be two reasons for our insufficient understanding of socio-environmental conflicts. Firstly, research on the issue has so far almost exclusively focused on violent conflict. However, violent conflict is usually only the last stage in an evolving social relationship between two groups (Chenoweth/Cunningham 2013). Secondly, and even more importantly, many studies on the links between environmental degradation, renewable natural resource scarcity and conflict are characterized by a positivist-rationalist bias. This bias manifests itself in three interrelated assumptions shared explicitly or implicitly by what one might call "mainstream" [26] in the research on socio-environmental conflicts:

Firstly, most of these mainstream studies assume that there is a material world which exists independent of human cognition and which can be perceived by humans in an objective way. For instance, all large-N investigations on the link between precipitation changes and conflict use satellite-measured rainfall data in order to operationalize their independent variable (e.g. Hendrix/Salehyan 2012; O'Loughlin et al. 2012). By doing so, they implicitly assume either that

[26] Mainstream here refers to those accounts that dominate in the internationally renowned journals that publish on renewable resource scarcity and conflict such as PNAS, Science, Nature, Journal of Peace Research, International Security or Political Geography.

rainfall reality is objectively measured by satellite data and that human perceptions of it do not matter, or that satellite data and local people perceive rainfall dynamics in the same objective way. Similarly, the classical case studies of Homer-Dixon and colleagues often use satellite- or expert-generated data to assess the degree of environmental degradation (e.g. Homer-Dixon 1994; Kelly/Homer-Dixon 1998). But various studies have concluded that perceptions of environmental problems, changes and risks are not only relevant for social actions, but also highly dependent on political, cultural, historical and personal backgrounds. Perceptions of environmental factors and dynamics are therefore far from objective (e.g. Mehta 2011; Murtinho et al. 2013). Rettberg (2010), for instance, shows that while many national and international observers diagnose a higher frequency and intensity of droughts in the Ethiopian Afar region, these claims are not reflected in the discourses of the local pastoralists, which are not homogenous either. And even if there is agreement on the existence and magnitude of an environmental problem, its meaning, causes and solutions are usually disputed (e.g. Engels 2008; Rettberg 2010; Wittayapak 2008).

Secondly, factors which can more obviously not be conceived as objective are hardly incorporated in the theoretical frameworks or empirical investigations of mainstream approaches, especially if quantitative methods are used (chapter 2). Recent works in conflict studies have emphasized the importance of concepts such as identities, narratives, threat perceptions or enemy images for the development of conflicts (e.g. Chatterjee 2012; Hansen 2006; Kaufman 2009). Anthropologic accounts have elaborated the symbolic dimensions of natural resource conflicts for quite some time (e.g. Hendrickson et al. 1996; Timura 2001). However, factors such as identities or narratives have, with the exception of some short references to ethnicity and past violence, so far hardly been considered in mainstream research on socio-environmental conflicts (but see Martin 2005; Zeitoun et al. 2013). This is of course true for large-N studies which have problems to quantify such variables. But also the majority of theoretical frameworks (e.g. Brauch 2009: 76-79; Buhaug et al. 2010) and case studies (e.g. Ember et al. 2012; Houdret 2012) largely ignore the importance of such assumed "soft" factors.

Thirdly, individual and collective actors are not only conceived as perceiving the world in an objective manner, but also as reacting rationally towards this objective reality. Just consider Salehyan's (2008) explanation for why climate change and resource scarcity are unlikely to raise the risk of violent conflict onset:

> "violent conflict is an inefficient and sub-optimal reaction to changes in the environment and resource scarcities […] Engaging in armed rebellion is quite costly and risky and requires large-scale collective action. Individuals and households are more likely to engage in simpler, personal, or smallscale coping strategies […] rebellion does not distribute resources by itself, and protracted civil wars can have devastating effects on the economy and the natural environment, leaving fewer resources to bargain over."

In other words, rational calculations about the resources they need, efficient strategies for acquiring them and the environmental impact of civil conflicts are considered to be the most important explanatory factors for the use of violence by individuals or social groups. However, rational choice-based theories are well known for missing several aspects highly relevant for the development of a conflict, such as narratives or intersubjective perceptions (Jabri 1996). One particular problem with rationalist accounts of conflict is their inability to explain the use of violence in cases where/when violence is considered a suboptimal strategy in terms of utility maximization (e.g. Jamerson/Wiessner 2008; Ringmar 1996 1-14).

In short, there exists a positivist-rationalist bias in the mainstream research on socio-environmental conflicts because many studies conceptualize individuals and social groups as utility maximizers which act in a rational manner towards a bio-physical and socio-economic surrounding which they can perceive in an objective way. This understanding has been challenged by various approaches. Environmental sociology (e.g. Engels 2008; Murtinho et al. 2013) and poststructuralist environmental security research (e.g. Hartmann 2010; Methmann/Rothe 2012), for instance, have highlighted the inter-subjective/discursive construction of environmental challenges, risks and threats as well as their importance for human actions. These insights can be combined with more recent works in constructivist conflict research (e.g. Kaufman 2009; Suzuki 2007) and identity studies (e.g. Abdelal et al. 2006; Morozov/Rumelili 2012) since both strands of research hardly focus on the social construction of environmental factors. Conflict research and identity studies, in turn, provide important insights about the worldviews, perceptions and identities which drive conflicts on the ground, a subject to which environmental sociology and poststructuralist environmental security research have not paid much attention yet (but see Fröhlich 2012). Political ecology has focused on "the simultaneity of symbolic and material struggles over environmental resources and their articulations with sedimented histories of violence" (Peluso/Watts 2001: 30). In the context of socio-environmental conflicts, political ecologists have highlighted the role of legitimacy constructions (Horowitz 2009), identities (Vandergeest 2003) and perceptions of environmental changes (Wittayapak 2008). These are important considerations when studying socio-environmental conflicts. However, political ecology can benefit from incorporating insights from conflict theory in general and particularly from the quite elaborate literature on identities and perceptions in conflict studies (see Dietz/Engels 2014).

This chapter adopts the focus of mainstream socio-environmental conflict research on the onset, escalation and de-escalation of local intergroup conflicts, but rejects the ontological assumption of an objectively accessible world inhabited by rational actors. It aims to make a twofold contribution of the literature: First, it introduces a comprehensive theoretical framework for

analyzing the inter-subjective or discursive dimensions of conflicts around renewable natural resources. In doing so, it combines Keller's Sociology of Knowledge Approach to Discourse with insights from environmental sociology, poststructuralist approaches to environmental security, political ecology as well as constructivist conflict research and identity studies. Second, the utility of this framework is demonstrated by discussing the Israeli-Palestinian water conflict. In doing so, the chapter contributes to a growing literature which highlights the importance of non-material factors for understanding socio-environmental conflicts (e.g. Allen 2012; Fröhlich 2012; Norman 2012; Stetter et al. 2011) as well as other types of conflicts (e.g. Chatterjee 2012; Kaufman 2009; Suzuki 2007). Simultaneously, it challenges the positive-rationalist bias inherent in the mainstream literature on socio-environmental conflicts (see above and section 3). The chapter proceeds as follows: At first, a theoretical framework for a discursive understanding of socio-environmental conflicts is introduced (section 2). A discussion of the Israeli-Palestinian water conflict will follow as an example of a socio-environmental conflict that cannot be explained by drawing on positivist-rationalist approaches (section 3). The discursive understanding of socio-environmental conflicts is then utilized to explain why there is a water conflict between Israel and Palestine and why is has not turned violent (section 4). Finally, a conclusion is drawn (section 5).

5.2 A discursive understanding of intergroup conflict

In this section, I will combine Keller's (2011a) Sociology of Knowledge Approach to Discourse (SKAD) with insights from constructivist and poststructuralist conflict research as well as identity studies, environmental sociology and political ecology in order to outline a discursive understanding of intergroup conflict suitable for analyzing socio-environmental conflicts. While the SKAD is well-established in the German academic community, it recently became more prominent in international debates as well (e.g. Escalante-Rengifo 2014; Zhang 2014). Keller (2011b) combines insights of the Foucaultian approach widely resonated in constructivist and poststructuralist conflict studies (Evans 2010) and environmental security research (Oels 2012) with the sociology of knowledge and symbolic interactionism, which is a basis for many works in environmental sociology (Hannigan 2006). This reduces theoretical incompatibilities when combining the SKAD with approaches from these disciplines. Furthermore, Keller (2013) provides clear definitions for his key concepts as well as a set of helpful methodological tools, standards and criteria which are helpful for empirical analyses.

Keller (2013: 73) defines a discourse as "a statement practice or totality of statement-events definable according to various criteria, which is investigated with regard to institutionally stabilized common structural patterns, practices, rules and resources for meaning-creation." In other words, discourses constitute collectively shared meaning and thus define what is considered

as true by a specific group. This applies not only to the evaluation of material conditions. Discourses also provide "subject positions" (Keller 2011a: 49) for social actors, which can be understood as interpretations of the role and character of these actors or as "identify offers" (Keller 2011b: 217). Following Keller, one can think of discourses as being characterized by a certain "phenomenal structure". This term refers to a set of central dimensions which can be detected in each discourse about a certain phenomenon (e.g. cause of a problem, possible solutions, relevant actors, subject positions).

Keller's definition of discourse also highlights that discourses are (re-)produced by human actions in the form of statements and cannot exist independently of those actions. Thus, drawing on Giddens (1986), Keller (2011a) assumes a relationship of mutual structuration between discourses and statements in the sense that discourses structure the form and content of statements while statements in turn (re-)produce or transform the discourse. This implies that discourses structure - or shape, facilitate and restrict - but never determine human actions. Next to statements, the SKAD conceives practices, understood as "conventionalized action patterns" (Keller 2011a: 55), as structured by and simultaneously reproducing discourses. The same is true for dispositifs, which are defined as the "institutional and organizational infrastructures set up to solve problems" (Keller 2011a: 56). This highlights the power effects of discourses and allows researchers using the SKAD to consider a broad range of actions and structures, although Keller's analytical and methodological guidelines focus primarily on statements (which are, however, the major focus of this chapter) (see Wilkinson 2007 for a related discussion).

In ontological terms, the SKAD seizes a middle ground between linguistic idealism and materialism/objectivism. On the one hand, Keller (Keller 2013: 61) emphasizes that reality is discursively constructed: "everything we perceive, experience, sense is mediated through socially constructed and typified knowledge […] We have no direct access to the world *per se*." But on the other hand, the SKAD also allows the inclusion of material factors in the analysis:

> "In this context, neither the resistant character of reality nor the existence of physical phenomena and processes that are independent from assignment of meaning are denied. Therefore, not everything can be 'successfully' said and practically 'done' in all kinds of ways about everything. However, the criteria for the evaluation of evidence and inconsistencies themselves are a part of discourses." (Keller 2011a: 62)

This resonates well with political ecology's emphasis on "the simultaneity of symbolic and material struggles" (Peluso/Watts 2001: 30). Keller's ontological pragmatism allows researchers to take into consideration the characteristics of bio-physical and socio-economic systems, but highlights that discourses structure how the relevant actors perceive and act towards these

systems.[27] This makes SKAD particularly suitable for an analysis of socio-environmental conflicts. Finally, a discourse is considered dominant if its core messages are accepted as true by a large majority of the members of a certain social group (Keller 2011a). This idea of dominance allows the consideration of collective actors, since, although social groups are internally fragmented, they can act as a collective if a dominant discourse on a certain issue is existent. This is an important feature of SKAD since research on socio-environmental and other forms of conflicts is almost exclusively focused on collective rather than individual actors.

How can the SKAD approach be combined with conflict theory? Following Baron (1990: 198) and Dietz/Engels (2014), an intergroup conflict can be defined as a process in which at least two collective actors conceive their respective interests as contradictory and undertake actions in order to enforce or articulate these interests. But interests do not just appear from nowhere in the minds of individual or collective actors. Rather, interests arise from and are strongly shaped by a group's collective identity:

> "Questions regarding identities must always take precedence over questions regarding interests. It is only *as some-one* that we can have an interest *in some-thing*; it is *only once we know who we are that we can know what we want*." (Ringmar 1996: 53)

According to Abdelal et al. (2006: 696), a collective identity is a social category which contains (i) "constitutive norms" that define who the members of a group are and by which attributes they are characterized and (ii) "social purposes", i.e. the goals of the group. Furthermore, identities are always relational and contain one or several Others against which a group defines itself (see also Guillaume 2002; Hansen 2006: 33-48).[28] The boundary markers which determine whether an actor belongs to the Self or is considered as an Other are called "diacritica" (Neumann 1999: 5). Examples of diacritica that are identified as driving intergroup conflict include "primordial resident – invader" (Eriksen 2001), "fair-minded – unjust" (Bar-Tal 1998) or "superior – inferior" (Staub 2001). Identities are also considered as likely to drive conflicts if the Other is perceived to be homogenous, if identities are seen as fixed and unchangeable and if the Other is constructed as a threat to the Self (Abdelal et al. 2006; Kaufman 2001; Korf 2006).

In line with the SKAD discussed above, identities can be conceived as subject positions and therefore should be considered as discursively constructed. However, Keller insists that not only identities, but also the broader perceptions of material conditions/contexts are constructed by dominant discourses. These perceptions are henceforth termed situation assessments and defined as the sum of an (here: collective) actor's causality assumptions and perceptions of surrounding

[27] Unfortunately, Keller does not discuss epistemological inconsistencies and problems associated with this pragmatic approach.

[28] Abdelal et al. (2006: 696) mention "cognitive models" as the fourth component. I dropped this category since very different identity groups do often use quite similar cognitive models (e.g. the Cold War logic between 1949 and 1989).

material conditions. In this respect, the SKAD is in line with political ecology, environmental sociology and constructivist conflict research, all of which have highlighted the importance of situation assessments for social groups' actions and interactions (e.g. Engels 2008; Janis 1982; Mehta 2011). Situation assessments are relevant for the framework presented here for three reasons:

a) Situation assessments and identities mutually influence each other. The attributes and capabilities ascribed to the Self (identity), for instance, influence how a social group perceives the threat emanating from an environmental change or the growing influence of another group (situation assessment) (Martin 2005). In turn, the assessment of the speed of economic growth in recent years or the military capabilities of neighbouring groups shape a group's identity as hard-working or inherently threatened.

b) Situation assessments influence interests since the existence of an interest requires the prior definition of a situation against which this interest is articulated. To give an example: Lowland farmers in northern Thailand often believe that they are negatively affected by land degradation and watershed destruction, which is caused by the swidden agricultural practices of highland dwellers. Thus, lowland farmers develop an interest in preventing this kind of highland agriculture, although the connection between swidden agriculture and environmental degradation is highly disputable (Vandergeest 2003). In a similar way, a group's interest in (concrete forms of) climate change mitigation and adaptation is influenced by the perceived consequences of climatic changes for the respective group (Brzoska 2009; Oels 2012).

c) Situation assessments are a key intervening variable between interests and actions since they define possibility spaces. For instance, a group might conclude that it is in its interest to attack a rival or prevent costal erosion. However, the group is unlikely to act in accordance with its interests if it assesses its technical, financial and military resources as insufficient to do so (Engels 2008; Le Billon/Waizenegger 2007).

In the literature, many situation assessments are discussed as playing a crucial role for conflict onset and escalation. Examples include the description of an Other as responsible for a problem the Self faces (Staub 2001), the perception of important resources as being limited and/or the object of a zero-sum game (Fröhlich 2010; Korf 2006), the description of a valued reference object as threatened (Buzan et al. 1998: 21-47) or the assessment of unilateral actions and eventual violence as promising in terms of resources, salvation or security (Bar-Tal 1998).

If one accepts that the identities and situation assessments are constructed by discourses, while interests and eventually actions are structured by identities and situation assessment, than it can be concluded that all intergroup conflicts have discursive origins (Buckley-Zistel 2006; Jabri

1996). Every action (i.e. statement or practice) of an actor, in turn, (re-)produces or modifies the very discourse it emanated from. The theoretical framework outlined above is summarized by Figure 13.

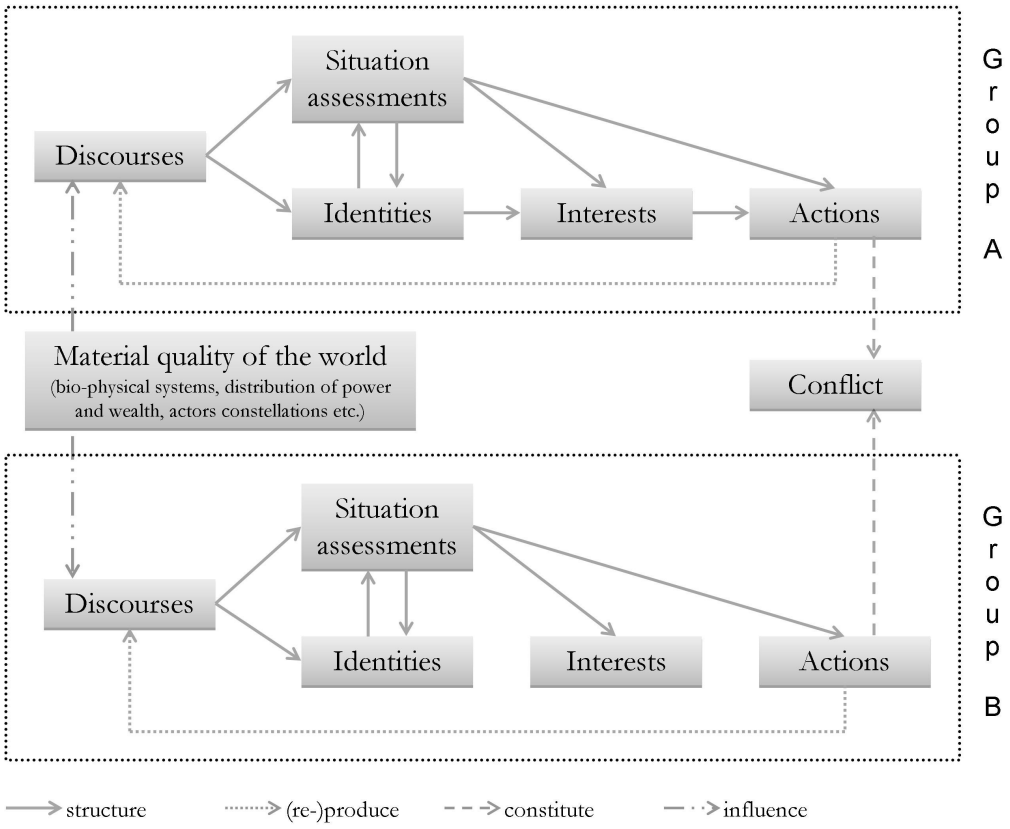

Figure 13: Simplified summary of a discursive understanding of intergroup conflict

By describing and analyzing dominant discourses with a focus on the groups' identities and situation assessments, it is therefore possible to understand the onset and dynamics of intergroup conflicts, including socio-environmental conflicts. Before I demonstrate the utility of the approach developed here, one final remark should be made. A discursive understanding of conflict implies that the onset, escalation or de-escalation of a conflict has to be understood not as an outstanding break, but as a social continuity. All actions relevant for the development of intergroup conflicts are fundamentally shaped by already existing and usually only slowly evolving discourses (Jabri 1996). This is not to deny the possibility of rapid changes leading to the (de-)escalation of a conflict. As elaborated by Kaufman (2001: 15-47), confrontational (or cooperative) discourses can exist for a long time until they are activated by triggering events such as the occupation of a symbolically important piece of land or the visit of a head of state.

5.3 The Israeli-Palestinian water conflict: an anachronism

The Israeli-Palestinian water conflict was chosen as a case study illustrating the discursive understanding of socio-environmental conflicts for four reasons. First, the Middle East in general, and Israel and Palestine in particular, are frequently said to be prone to water-related conflicts (e.g. Amery 2002; Kelly/Homer-Dixon 1998; Scheffran/Battaglini 2011). Second, Israel and Palestine are due to their warm and for most of the year dry climate often portrayed as prone to water scarcity (e.g. IWMI 2006), thus being seemingly a hard case for a study highlighting the importance of inter-subjective and discursive vis-à-vis objective and physical factors. Third, various works on the water discourses in Israel and Palestine already exist (see below) and enable the comprehensive portrayal of these discourses within the study at hand. Finally, the Israeli-Palestinian water conflict has so far remained non-violent, thus complementing the existing literature which has so far mainly focused on socio-environmental conflicts once they became violent (see above). A conflict can be considered as non-violent if none of the parties involved uses direct, physical violence against human beings in a systematic and organized manner in order to pursue its (in the context of this chapter: water-related) goals. This does not preclude the existence of other forms of violence, e.g. structural violence.

There clearly exists a water conflict between Israel and Palestine, although it is just one (and presumably a minor) of several interrelated dimension of the overall Israeli-Palestinian conflict (which also includes political, territorial, religious and economic conflict aspects).[29] Water has been a contentious issue in the past peace negotiations between Israelis and Palestinians (Lautze et al. 2005). In fact, water is one of the topics on which no final (but only a provisional and contested) agreement could be reached during the peace process in the 1990s (Zeitoun 2008: 64), accompanied by issues such as the status of Jerusalem, the definite borders or the right of Palestinian refugees to return.

The existence of a water conflict is also expressed by current patterns of water distribution. In line the SKAD's pragmatic ontology discussed above, these are considered as real in this chapter, although the ways in which people perceive and act towards them are structured by dominant discourses. According to the Oslo II interim agreement, signed in 1995 by the Israeli government and the Palestine Liberation Organization (PLO), Israelis can withdraw 912 million cubic meters (MCM) per year from the shared mountain and coastal aquifers[30], while Palestinians are only allowed to use 253 MCM/year (Zeitoun 2008: 48). Furthermore, Israel extracts 600-700 MCM per year from the Jordan, while Palestinians have no access to the river at all (Selby 2013). Fresh water availability in Israel per capita is estimated to be approximately four times higher than in

[29] In empirical research, however, it is usually possible and often analytically helpful to analyze these dimensions separately before studying their interactions (Stetter et al. 2011).

[30] An aquifer is an underground rock or sand layer that stores and channels water.

Palestine (Brown/Crawford 2009), with many Palestinians living below the WHO recommendation of 100 liters of water per day (B'Tselem 2013; Daoudi 2009; Lautze/Kirshen 2009).

This unequal utilization of the region's water resources is consolidated and even increased by the Israeli-Palestinian water governance regime. Under the institutional framework established by the Oslo II accord, the Israeli administration can effectively block the development of water infrastructure or the rising of well extraction quotas in the West Bank, while Palestinians have no way to influence water-related projects or the utilization of shared water resources on Israel's territory (Gray/Hilal 2007; Selby 2003a; Zeitoun 2008: 99-110). A recent study concluded that only 30% of the wells, 50-80% of the water supply and 58% of the wastewater projects requested by the Palestinians are finally approved by the Israeli administration, and that a delay of several years between the application for and the approval of the project is usual (Selby 2013). Palestinians have little chances to change this situation since large parts of the West Bank are still occupied by Israel, while the Gaza Strip is largely sealed off. Especially in the West Bank, Israel is able to enforce the unequal water regime by destroying unauthorized water pipes, wells and pumps (Selby 2013).

The large majority of Palestinians is clearly not satisfied with the current situation and strives for an adjustment of water extraction quotas and the bilateral water policy framework (PNA/PWA 2012; Udasin 2013). The Israeli administration, in contrast, prefers to preserve the status quo, arguing inter alia that Palestinians are frequently violating the bilateral agreements by drilling wells without Israeli approval, that Israel supplies more water to Palestine than it is obliged to according to the Oslo II accord, and that water shortages in the West Bank and Gaza Strip are mainly caused by internal management failures (IWA 2009; Udasin 2013). However, neither the Israeli government nor the PLO (or the Hamas) have tried to secure access to water sources and infrastructure through acts of direct, physical violence against the other group since the 1967 war (which was not about water).

So although there clearly is a (non-violent) water conflict between Israel and Palestine, it cannot be explained by mainstream approaches to socio-environmental conflicts. This is true for theoretical frameworks utilized or developed by large-N studies (e.g. Fjelde/von Uexkull 2012; Koubi et al. 2012), which focus on the absolute scarcity of important renewable resources, partially because quantitative data on resource distribution are hardly available. But also the arguments put forward by mainstream qualitative accounts often primarily deal with the absolute scarcity of renewable natural resources. They acknowledge the importance of "resource capture" (Homer-Dixon 1994: 10) by elites or "the misdistribution of renewable resources" (Kahl 2006: 29), but consider them as relevant only within a context of absolute scarcity of important natural

resources. However, I will now show that water as a physical quantity is neither extraordinarily scarce nor economically important in Israel and Palestine.

According to Feitelson et al. (2012), there will be enough water to satisfy domestic water needs and the water demands of farmers who have no economic alternative to agriculture in Israel and the West Bank at least until 2030, and most likely well beyond (Messerschmid 2012). This holds true even under extreme climate change and population growth scenarios (Feitelson et al. 2012). Improvements in water management, wastewater recycling and especially desalination are likely to relax the situation even more (Fischhendler et al. 2011). The total domestic and parts of the agricultural water demands of the Gaza Strip can be satisfied by one large-scale desalination plant alone (Feitelson et al. 2012) and an increased provision of water to the West Bank would also be much cheaper for Israel than sustaining the current occupation (Selby 2005). In addition, a large amount of virtual water is imported to the region in the form of food (Allan 2002). According to Shuval (2007), Israel imports 80% and Palestine 65% of its national calorie intake, thus making claims about food sovereignty illusory anyway. Finally, agriculture, the by far most water-intensive economic sector, employs only 1.5 % of the Israeli and 7.0% of the Palestinian population (FAO 2013) and accounts for no more than 2.5% respectively 5.3% of the GDP (CIA 2012). The low economic significance is accompanied by a dwindling political relevance of agriculture since the social basis of political movements (e.g. parties, NGO, protest groups) is increasingly located in urban areas (Selby 2005).

So if it is "evident that water is of only marginal significance within the political economy of the modern Middle East" (Selby 2005: 331), why can we still observe such a protracted water conflict between Israel and Palestine? The first answer one might think of is: The water conflict is a by-product of the Israeli occupation of the West Bank and the wider Israeli-Palestinian conflict, it is inconvenient for Israel to change a situation it only benefits from, and Palestine as the clearly less powerful actor simply lacks capacity to initiate any changes. However, there are numerous examples of conflicts in which the stronger party made water-related concessions or in which water issues were separated from the wider conflict dynamics. Wolf et al. (2003: 40), for instance, conclude: "Some of the most vociferous enemies around the world have negotiated water agreements or are in the process of doing so. The Mekong Committee has functioned since 1957, exchanging data throughout the Vietnam War […] The Indus River Commission survived through two wars between India and Pakistan." Similarly, there are numerous examples of socio-environmental conflicts in which a by far weaker party conducted significant actions to challenge the dominance of the stronger side, sometimes with the consequence of violent escalations (e.g. Assies 2003; Bobrow-Strain 2001). This again underscores the shortcomings of materialist and rationalist accounts when analyzing socio-environmental conflicts. The next section therefore

uses the discursive understanding of intergroup conflict presented above in order to analyze the Israeli-Palestinian water conflict.

5.4 Dominant water discourses in Israel and Palestine

In this section, I will describe the dominant Israeli and Palestinian water discourses and analyze how they can explain the existence of the protracted (but non-violent) water conflict. In order to do so, I primarily utilize the insights of various studies on different aspects of the water discourses in Israel and Palestine. These are complemented by information I gained during field research in early summer 2013, which focused on water cooperation projects, but provided me the opportunity to have background discussions with representatives of the dominant (water) discourses in Israel and Palestine. But before proceeding, it has to be mentioned that these water discourses are intertwined with and deeply connected to the wider discursive structures of both societies which cannot be discussed here in detail due to space constraints (see Fröhlich 2010). Simultaneously, it should be noted that the Israeli water discourse is much more accepted in the international arena (Messerschmid 2012; Zeitoun 2008: 120-122). And finally, the concept of a dominant discourse does not imply that there are no competing water discourses in Israel and Palestine (there are, see e.g. Alatout 2006; Feitelson 2002; Fröhlich 2010). However, if a discourse is not dominant, than its core messages are not shared by a majority of the people and/or policy makers. Such discourses are therefore less influential in structuring the interests and actions which constitute the water conflict (Feitelson 2002).

Following the SKAD, discourses are characterized by phenomenal structures which describe the constitutive dimensions of their referent objects, in this case water in Israel and Palestine (see above). I consider this a useful heuristic device and structure the following discussion of the Israeli and Palestinian water discourses along the following four dimensions: assessment of the water situation/causes of water problems, identities/subject positions, symbolic relevance of water, and policy suggestions.

According to Selby (2003b: 21-32), three types of discourses can be distinguished regarding the *water situation and the causes of water problems*: An "ecological discourse" states that regional water resources are limited, while population and demand are growing. According to a "technical discourse", water problems are caused by inefficient infrastructures and administrations. Finally, a "political discourse" insists that water scarcity is a product of unequal water distribution and thus ultimately of unequal power relations.

The Israeli assessment of the water situation combines elements of an ecological and a technical discourse. On the one hand, it insists that water in the Jordan basin is not sufficient to keep (let alone rise) current living standards in the region in the face of population growth, aquifer

degradation and climate change. In the face of these challenges, it would be unwise to relinquish control over the aquifers and the Jordan River, although seawater desalination and wastewater recycling have for the time being alleviated water scarcity in Israel (Fröhlich 2012). The availability of additional water resources due to desalination has therefore not yet caused a major desecuritization of water in the Israeli discourses or a greater willingness to share the aquifers (and the Jordan river) with the Palestinians (Aviram et al. 2014; Feitelson/Rosenthal 2012). The lack of good-quality water available for the Palestinians, on the other hand, is constructed as caused by their own faults. Water scarcity in the West Bank and Gaza is depicted as a result of inefficient water management, the failure to establish an adequate water and wastewater infrastructure and the heavy pollution of water by the Palestinians. By contrast, water management in Israel is portrayed to be excellent, as can be seen by Israel's very effective irrigation schemes, wastewater recycling and seawater desalination (Feitelson 2013; Messerschmid 2012; Selby 2005).

The dominant water situation assessment in Palestine, by contrast, can be classified as a political discourse. Water resources in the region are described as sufficient to at least significantly increase the quantity and quality of water available for the Palestinians. Consequentially, the unequal distribution of limited regional water resources (or, to use a wording close to the Palestinian discourse, the illegitimate Israeli appropriation of shared water resources) is perceived as the root cause of water problems in Palestine (Alatout 2006; Daoudi 2009; Waintraub 2009). Intra-Palestinian water management problems, such as low investments in water infrastructure or an uncoordinated decentralisation of water-related competences, are unsayable in the dominant Palestinian water discourse (Fröhlich 2012):

> "On the Palestinian side, it is deemed unacceptable to attribute water problems to any other cause than the Israeli occupation and the theft of Palestinian water by the Israelis. The identification of any other cause is immediately labeled as Palestinian anti-nationalism." (Trottier 1999: 164)

The assessments of the water situation in the Israeli and Palestinian discourses are drivers of the water conflict. Both discourses acknowledge the limits of water availability in the region. More importantly, however, the causes of the water problems are disputed between the dominant discourses of both sides, with each side (partially) portraying the Other as responsible for the water scarcity and/or pollution problems the Self faces.

Related to these situation assessments, confrontative diacritica can be found in the *identity constructions or subject positions* provided by both discourses. While Israelis are depicted as reasonable, developed and good water managers in the dominant Israeli discourse, Palestinians are described as irrational, underdeveloped and water polluters. In the Palestinian discourse, by contrast, Israelis are referred to as selfish, ruthless and unfair, while Palestinians do not over-use

and are ready to share common water resources (e.g. PNA/PWA 2012). Since both discourses refer to the Other in general terms and intra-group water conflicts are denied, both groups are constructed as homogenous, thus paving the way for negative stereotyping (see section 2).

In addition, the *symbolic relevance of water* is considered high in the discourses of both sides.[31] Within the traditional Zionist ideology, water is closely related to agriculture, which is in turn crucial for key Zionist goals such as settling the Holy Land and creating a safe Jewish homeland (Feitelson 2013; Lipchin 2007). The related identity offer is the "chalutz, the pioneer, who helps to build a Jewish state and thus contributes to the redemption of the 'chosen people'" (Fröhlich 2012: 129f.). Water disputes with its neighbours further contributed to the securitization of water in Israel (Amery 2002). Although water has partially lost prominence in public and policy making discourses nowadays (Feitelson 2002), sufficient water availability and control over the region's water resources are still considered to be an important precondition for the survival of the Jewish state (Feitelson 2013). As a consequence, relinquishing this control is largely unsayable in the dominant Israeli discourse (Messerschmid 2012; Twite 2009).

Despite also not being at the centre of public and political attention (de Châtel 2007), water is considered to be highly important in the Palestinian discourse for two reasons. Firstly, water is conceived as an attribute of the land which rightfully belongs to the Palestinians, but is currently occupied by Israel. The idea of control over sufficient water resources is therefore intrinsically tied to control over land and thus closely connected to Palestinian self-determination and a viable Palestinian state (Fröhlich 2012; Twite 2009). Secondly, the "myth of the fellah, who works and sustains his land even in the worst of circumstances (and needs water to do that)" (Fröhlich 2012: 136) continues to play a role for Palestinian identity construction in spite of increasing urbanization.

The different assessments of the water situation, the negative diacritica related to them and the high symbolic relevance of water drive dissimilar and contradictory *policy suggestions*. On the Israeli side, a "Needs, not Rights Discourse" (Zeitoun 2008: 77) is promoted. It advocates the allocation of water resources according to needs, while water rights and thus control over water resources should remain almost exclusively in Israeli hands. This claim is inter alia justified by the identity construction of Palestinians as bad and Israelis as good water managers. Palestinian water needs are acknowledged, but Israeli ones are considered to be higher since Israel is a more developed society and inherently threatened by its neighbours (Waintraub 2009; Zeitoun 2008: 77-79). This needs-based approach is strongly rejected within the dominant Palestinian water discourse. Instead, a rights-based approach is promoted: Independent of actual needs, all water that is

[31] The symbolic relevance of water is a cross-cutting aspect of the phenomenal structure which is highly important for both situation assessments and identity constructions. It is therefore treated separately here.

located on or under Palestinian territory (in the borders before the 1967 war) should be under Palestinian control (Waintraub 2009; Zeitoun 2008: 80).

These contrasting discourses are an important driver of the Israeli-Palestinian water conflict, which becomes manifest not only in the form a deadlock on the negotiation table, but also in the form of a highly unequal distribution of water and severe restrictions on Palestinian water infrastructure development. Although the Israeli and the Palestinian water discourses do not totally preclude its possibility, they define quite specific circumstances for water conflict resolution and cooperation to take place (Fröhlich 2012; Trottier 1999: 164-166; Twite 2009).

But if the dominant water discourses in Israel and Palestine are quite confrontational, why is no direct, physical violence used to enforce the water-related claims by the two sides? Obviously, Israel is much stronger in terms of military, economic and bargaining/relational power (Zeitoun 2008). However, this factor alone cannot account for the absence of violence since there are numerous socio-environmental conflicts which erupt into violence despite large power differences between the parties involved (see above). But the dominant discourses and specifically the situation assessments they provide enhance our understanding in this regard. Within the Palestinian discourse, it is widely accepted that Israel is the dominant technological and military power in the region. Violent resistance against Israeli water policies is deemed as futile and even counter-productive, since it would provoke strong Israeli reactions and thus worsen the Palestinian (water) situation even more (Selby 2013; Zeitoun 2008: 87-98). As long as Palestinians do not use violence there is, according to the dominant Israeli discourse, no need for the Israelis to use violence either. Aside from the fact that most water-related claims articulated by the Israeli discourse are currently satisfied, the use of violence is considered as a politically and economically too cost-intensive strategy to improve the Israeli water situation (Csillag 2012; Selby 2005).

5.5 Conclusion

This chapter started with the identification of a positivist-rationalist bias in the research on the links between renewable natural resources and conflicts. This bias is problematic given that environmental sociology and poststructuralist environmental security research emphasize the social construction of environmental changes and threats, while constructivist conflict research and identity studies highlight the relevance of identities and situation assessments for conflict dynamics. Several political ecology case studies have also shown the advantages of including constructions of ethnicity and perceptions of environmental situations and resource use priorities into the analysis of socio-environmental conflicts (e.g. Benjaminsen 2008; Wittayapak 2008). This chapter combined the insights of the these complementary approaches with Keller's SKAD in

order to develop a comprehensive framework which allows the systematic consideration of inter-subjective factors in the research on socio-environmental conflicts. It then discussed the example of the water conflict between Israel and Palestine, which cannot be understood as an outcome of the decisions of rational actors in an objectively given political, economic, geographical and hydrological setting. The discursive understanding of socio-environmental conflicts, by contrast, was able to explain the existence of a severe water conflict between Israel and Palestine as well as its non-violent character. It thus also enhances our understanding of the relationship between the existence of conflict and the use of violence – an issue which has not received sufficient attention so far (e.g. Chenoweth/Cunningham 2013).

By emphasizing the inter-subjective dimensions of intergroup conflicts, the theoretical framework developed has the potential to improve our understanding of other socio-environmental conflicts as well. To give just as few examples: Inter-subjective constructions of rainfall changes (chapter 3), negative diacritica (Schilling et al. 2012), or perceptions of commercial opportunities (Eaton 2010) are frequently mentioned as relevant factors for pastoral conflicts in northern Kenya and Uganda, but are hardly systematically discussed. McCarthy (2004: 1206) shortly mentions, but does not elaborates the role of the *putra daerah* or marginalization discourse for the dynamics of forest conflict in Kalimantan, Indonesia. Finally, the partially violent conflict about fishing regulations on the Galápagos Islands can only be understood if one takes the contradictions between a post-political conservationist and a local livelihood/development discourse as well as the related identity constructions/subject positions and situation assessments into account (Celata/Sanna 2012).

On theoretical level, future research should connect the framework developed above even stronger to political ecology approaches. This would enable researchers to get a more complete picture of the role power asymmetries and marginalization processes play in socio-environmental conflicts (e.g. Horowitz 2009; Peluso/Watts 2001; Selby 2013), especially since the SKAD acknowledges the "material quality" of the world which "confronts us with problems of interpretation" (Keller 2013: 61). The possible epistemological inconsistencies associated with Keller's pragmatic ontology should be addressed as well. It is also important to assess how global/international discourses often analyzed by poststructuralist environmental security scholars (e.g. Detraz/Betsill 2009) interact with local discourses in order to create more or less conflictive identities and situation assessments. Particularly interesting in this regard are conservation discourses (Celata/Sanna 2012; Karki et al. 2006; Wittayapak 2008).

On a practical level, a discursive understanding of socio-environmental conflicts implies that conflicts around scarce natural resources are not primarily driven by greedy or impoverished actors which strive to increase their control over these resources, but that confrontative situation

assessments and identity constructions are an important cause for such conflicts. Consequentially, efforts towards prevention, mediation and solution of these conflicts should not just aim at improving agricultural practices or providing more water (Bichsel 2009a), but utilize tools which aim at making the discourses of the parties involved more compatible and cooperation-prone (e.g. Buckley-Zistel 2006; Ochs et al. 1996).

6 A discursive understanding of water conflict and cooperation in Israel and Palestine[32]

6.1 Introduction

The non-violent, but still severe water conflict between Israel and Palestine is driven by disputes over the distribution of water from shared aquifers[33] and the Jordan River (Zeitoun 2008), over water pollution originating in the West Bank and Israel (Fischhendler et al. 2011), and over permission for the construction and maintenance of water infrastructure in the occupied West Bank (Selby 2013). Water is one of the topics which has proven very contentious in past Israeli-Palestinian negotiations and has always been postponed to the final status talks (Lautze et al. 2005). The water conflict between the Israelis and Palestinians is embedded into and closely connected to the dynamics of the wider Israeli-Palestinian conflict which has been going on for almost a century (Moore/Guy 2012). However, there also is cooperation on water issues, which is all the more remarkable within a political context that is marked by mutual suspicion and hostility. For instance, Israeli and Palestinian communities cooperate over shared water resources under the Good Water Neighbours (GWN) projects (see below). They are part of a counter movement which has been developing since the early 1990s (Isaac/Shuval 1994) and which focuses on the cooperative potential of joint water management and its possible role for (environmental) peacebuilding (Coskun 2009; Kramer 2008).

How can this occurrence of water cooperation in a context that is largely marked by inter-group (water) conflict be explained? The environmental peacebuilding perspective argues that shared environmental challenges, such as the degradation of cross-border water resources, can stimulate cooperation and thus improve the relations between hostile groups (Conca/Dabelko 2002a). This is the case because environmental problems affecting several groups either provide material incentives (e.g. benefits created through coordinated water management) to engage in cooperative behavior, or because they produce a "community of sufferers" (Fritz 1996: 28) with a higher level of empathy and solidarity towards each other (Lejano 2006). While this might hold true for the movements promoting water cooperation (such as GWN), the environmental peacebuilding perspective cannot explain why under very similar political, economic, historical, geographic and hydrological circumstances, water conflict rather than cooperation prevails on the international level between Israel and Palestine.

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[33] An aquifer is an underground rock or sand layer that stores and channels water.

This puzzle can be solved through the environmental conflict perspective. It claims that a scarcity of renewable natural resources, such as water, increases the risk for (violent) conflict between social groups over this resource (e.g. Homer-Dixon 1999). This is especially the case if the relations between the respective groups are characterized by pre-existing political or cultural tensions, unequal access to the resources under question and/or the political marginalization of one group (Barnett/Adger 2007; Carius et al. 2006: 36-40). All this certainly holds true for the Israeli-Palestinian water conflict, but again the question remains why some local communities cooperate over water issues within a quite similar context?

One part of the explanation certainly refers to the different actors involved. Civil society activists are said to have a greater degree of freedom to engage in cooperative interactions, because they are less influenced by various constituencies and lobby groups, face no pressure to secure re-election and can leave aside wider or more contentious issues (Coskun 2009). However, in the Israeli-Palestinian context, activists on both sides often experience considerable pressures when they engage in the establishment of more cooperative relationships (Alatout 2006). In addition, the different political and institutional environments faced by, for instance, members of government and local civil society activists, cannot explain why some communities along the Israel-West Bank border engage in water cooperation, while the large majority does not.

This chapter provides a new perspective that helps to explain the simultaneity of water conflict and water cooperation between Israel and Palestine, and thus, by extension, the occurrence of socio-environmental conflict and cooperation more generally. A recent wave of studies utilizing constructivist approaches has highlighted the relevance of identities (Green 2015), ethnic stereotypes (Wittayapak 2008), different interpretations of the extent and causes of environmental degradation (Murtinho et al. 2013), securitization processes (Fröhlich 2012; Stetter et al. 2011) and legitimacy constructions (Horowitz 2009) for understanding socio-environmental conflict and cooperation. We draw on the insights gained by these approaches as well as on discourse theory and constructivist peace and conflict research in order to develop a discursive understanding of socio-environmental conflict and cooperation. The main supposition of this approach is that the decisive factor for the occurrence and development of socio-environmental conflict or cooperation is not an objectively perceivable ecological or social reality, but rather how interests are constructed by the dominant discourses of the respective groups.

After introducing our theoretical framework in the following section, the validity of this approach in explaining water conflict and cooperation is tested. First, we will depict the dominant water discourses in Israel and Palestine and explain how they facilitate confrontative behavior. Then, we analyze the discourse of a movement which favors Israeli-Palestinian water cooperation over conflict, namely the GWN project. Our conclusion is that analyzing the dominant discourse

structures of the respective groups is indeed a precondition for understanding why socio-environmental conflict or cooperation occurs in nearly identical eco-socio-political settings.

6.2 A discursive understanding of socio-environmental conflicts and cooperation

In this study, we draw on the Sociology of Knowledge Approach to Discourse (SKAD) as developed by Reiner Keller (Keller 2011b). This framework was chosen since it combines the strengths of the Foucaultian discourse analytic approach with the insights of the sociology of knowledge in the tradition of Berger/Luckmann (Keller 2011b). In addition, Keller (2013) provides explicit definitions for his key concepts as well as a comprehensive set of methodological tools and criteria, something which is not the case for all discourse approaches in peace and conflict studies (e.g. Milliken 1999).

Keller (2011a: 48) defines "discourses as performative statement practices which constitute reality orders and also produce power effects in a conflict-ridden network of social actors." This is to say, a discourse is a set of rules about what is accepted as true and becomes manifest in various concrete speech acts, texts, images and symbols (the production of which is conceived of as a form of human action). Discourses define what is sayable and what is claimed wrong or is not considered at all in a given situation and (historical) moment; as Jäger (2004) put it, a discourse is the flow of social knowledge through time. This drives the conclusion that "everything we perceive, experience, sense is mediated through socially constructed and typified knowledge" (Keller 2013: 61) - in other words, through discourse. Discourses thus execute significant power effects, since they structure (but not determine) social actors' perceptions and interpretations of reality as well as the actions (or practices) emerging from these interpretations and the manifest structures that are the results of these actions (dispositifs).

Practices and dispositifs, in turn, reproduce the very discourse they are originating from. This understanding of a reciprocal connection between discourses and actors/actions implies a conception of discourse as dynamic and persistent at the same time. Discourses are dynamic because they must be reproduced by human actors who own the capacity to reflect, resist and modify the meanings provided through specific discourses. At the same time, discourses are persistent, since human action is enabled and structured by already existing discourses, thus implying a certain kind of reproduction of the dominant discursive structures. A discourse is termed dominant if its core statements are accepted as true by a large majority of the members of a certain social group (Keller 2011a).

This understanding of discourse and the discursive construction of reality can be connected to constructivist conflict theory. Dietz et al. (2006: 565), for instance, write:

> „we observe the existence of a conflict when an actor constructs his or her […] interests in such a way that these cannot be made compatible with the […] interest of another actor. Conflict is therefore discursively constructed."

In line with this definition, we understand every conflict as driven by mutually incompatible interests. But interests are neither primordial nor rational; instead, they emerge from the perceptions and interpretations of the respective groups (Hansen 2006; Jabri 1996), which are constructed by the dominant discourses. Especially the discursive construction of collective identities and situation assessments is relevant for how social groups define their interests. Identities encompass "the formal and informal rules that define group membership […,] the goals that are shared by the members of a group" and relational comparisons with other identity groups (Abdelal et al. 2006: 696). In short, collective identities define how the respective groups understand themselves in relation to others and how they define their interests (Buckley-Zistel 2006; Morozov/Rumelili 2012). Thus, collective identities are integral to the onset and reproduction of conflict (Fröhlich 2010: 38-40; Jabri 1996: 5).

However, interests are also shaped by situation assessments, which define how a group perceives its social and material environment (e.g. Is there degradation of water resources, and if so, who is responsible for it? Which capabilities can be mobilized by the respective groups?). The concept of securitization has proven especially helpful in this context. A securitization exists if a valued reference object (e.g. national sovereignty) is portrayed as existentially threatened, leading to the acceptance of measures which are usually considered as inappropriate or exaggerated, e.g. the use of violence (Buzan et al. 1998: 21-47; Stritzel 2007).

Cooperation exists "when one or more parties engage in jointly coordinated actions with other actors to secure shared" interests (Ravnborg et al. 2012: 349). Again, we understand interests as shaped by identities and situation assessments. We see cooperation as a social continuity, since cooperative - like conflictive - behavior is enabled and shaped by dominant discourses (Jabri 1996; Kaufman 2006), which evolve slowly over time and hardly undergo dramatic changes in short periods.[34] As a consequence, identities and situation assessments cannot easily be manipulated by elites, since they "have to be connected, in credible ways, to people's personal experiences" (Eriksen 2001: 61), which are structured by already existing discourses.

The transformation of a conflictive into a cooperative discourse is possible whenever the interests of the parties involved are constructed as mutually compatible by the dominant discourses of the respective groups. This is the case when the inclusion/exclusion boundary between in-group and out-group is blurred, thereby feeding a counter-discourse which deconstructs and de-legitimates hitherto valid myths of unity, duty and conformity (Jabri 1996: 7).

[34] This is not to deny that often a precipitating event is necessary for discourses to become manifest in concrete conflictive or cooperative actions (Hislope 2007: 150-154).

However, it also remains possible that groups continue to view each other in mutually exclusive terms, but cooperate on an ad-hoc basis, since their discursively constructed situation assessments leads them to the conclusion that they have a shared interest regarding a certain issue.

6.3 The Israeli-Palestinian water conflict and its discursive foundations

The Israeli-Palestinian water conflict is shaped by political developments as well as by the region's geographical, climatic, hydro(geo)logical and demographic realities (Feitelson 2013; Zeitoun 2008). The latter are factual circumstances; however, the term "water" not only stands for the chemical element H_2O and seemingly "objective" data, but also for countless social, material and symbolic mediation processes, for the resource's different functions and the stakeholder interests connected to them (Fröhlich 2010; Mehta 2005).

The most important freshwater sources for Israel and the Palestinian territories are the Jordan River (including the Sea of Galilee) and various aquifers. The Jordan basin is international and - in theory - shared between Jordan, Israel, Lebanon, Syria and the Palestinians (Fröhlich 2010: 19-23). But up to today, the Palestinians have no access to the Jordan river whatsoever (Selby 2005). The region's climate is arid to semi-arid, with frequent and - due to global warming - increasing droughts (Feitelson et al. 2012). The biggest subterranean water reservoirs are the coastal and the mountain aquifer with 240 and 679 million cubic meters per year respectively (Dombrowsky 1998: 94). Both are considered as crucial for the water supply of Israel and Palestine, especially during the dry summer months, and are not confined to either party's territory (Zeitoun 2008: 45-59).

Ever since the systematic Jewish immigration into Palestine began in the late 19th century, and up until the 1980s, water continuously gained economic and political relevance for the *yishuv* - the pre-state Jewish community in Palestine - as well as for Israel (Feitelson 2002; Lipchin 2007). Similarly, control over water is perceived by many Palestinians as crucial for a viable Palestinian state as well as for improved living and economic conditions in Palestine (Alatout 2006; Fröhlich 2012). It was one of the main outcomes of the Six Day War of 1967 that Israel brought 80% of the regional water resources under its control. Since then, Israel withdraws much larger quantities of water from the Jordan river and the shared aquifers than the Palestinians, while the latter are entirely dependent on Israeli permissions to realize water infrastructure development (Selby 2005; Zeitoun/Mirumachi 2008). The Oslo talks of the 1990s established the Israeli-Palestinian Joint Water Committee, which brought very little progress in this respect and is thus strongly criticized (Selby 2013).

The dominant water discourses in Palestine and Israel have developed in the context of this stark political asymmetry.

6.3.1 Palestine

In the Palestinian dominant discourse, the existing natural water resources are believed to be sufficient at least for a major improvement of the Palestinian standard of living (which is not to deny the general limits of water availability in an area with an arid to semi-arid climate and a rapidly growing population). The Israeli control over most of the water sources as well as Israel's capacity to veto water infrastructure projects in the JWC is seen as the major cause of water availability problems in the West Bank (Alatout 2006; Waintraub 2009). In the Palestinian perception, the experienced water scarcity is entirely politically induced (Daoudi 2009; Trottier 1999). Israeli control over large parts of the regional water resources is considered as absolute and as an existential threat to Palestinian society and hence securitized in the dominant discourse. The insufficient access to the natural water resources of the West Bank and the Gaza strip (prior to the disengagement) is, according to this argument, a threat to the viability of a Palestinian state (Fröhlich 2012).

This rather confrontative situation assessment is connected to similarly conflictive identity constructions in the dominant Palestinian discourse. Water is perceived as important primarily as an attribute of a territory that is considered rightfully Palestinian and thus crucial for a Palestinian state and identity, but has been under Israeli control since 1967. Consequentially, the Israeli out-group is at least implicitly portrayed as selfish and unfair, since it is unwilling to grant the Palestinians the amount of water that they are not only entitled to, but also need to keep their standard of living and to enable at least moderate economic growth (Fröhlich 2010; Twite 2009). These dominant discourse structures reflect a dominant mentality of siege which mirrors the Israeli such mentality (see below). One manifestation thereof is the myth (or identity) of the *fellah*, who works and sustains his land even in the worst of circumstances - and needs water to do that (Fröhlich 2012).

There certainly are alternative voices which challenge the dominant Palestinian water discourse (Alatout 2006). Examples include more pragmatic voices that criticize Palestinian water management and thus acknowledge the in-group's responsibility for the water scarcity Palestine experiences (Fröhlich 2010). But the dominant discursive pattern is to construct water availability as crucial for the Palestinian identity and future state, to securitize Israeli control over the majority of the natural water resources and to blame the out-group for being solely responsible for water shortages in the Palestinian territories (Alatout 2006; Twite 2009; Waintraub 2009). The

Palestinian dominant water discourse is thus quite confrontative vis-à-vis Israel and has not received any major de-securitization impulses as yet (Fröhlich 2012).

6.3.2 Israel

Just like its Palestinian counterpart, the Israeli water discourse is far from homogenous (Feitelson 2002). However, in the dominant Israeli discourse, water is deeply interwoven with agriculture, the creation of a Jewish state/homeland and the Israeli identity. The roots of water's ideological meaning for Israel lie in political Zionism, which is shaping the political decisions of the State of Israel until this very day (Lipchin 2007). The link between Zionism's main goal of a viable Jewish state on biblically promised land and water is agriculture. On the one hand, agriculture made it possible to settle and control the Jewish homeland (Feitelson 2013). On the other, Jewish immigrants could, by working with the land and owning it, shed their European, Western, urban image and substitute it through a new identity: that of the *chalutz*, the pioneer, who helps to build a Jewish state and thus contributes to the redemption of the "chosen people" (Fröhlich 2012). Thus, both settlement and agriculture aided the fact that water as a resource melted together with the "Zionist[...] ethos of land, pioneer heroics, and national salvation" (Rouyer 1996: 30). Zionism rooted the idea of "settling the land" and "making the desert bloom" as some of the Jewish state's central concerns in Jewish collective memory. A sufficient water supply hence became a vital part of the Jewish-Israeli identity (Fröhlich 2012), even if water issues (no longer) dominate public debates and media coverage (de Châtel 2007; Feitelson 2013).

In addition, the holocaust and the repeated threats by Arab neighbors contributed to the development of a security discourse which conceived the Jewish state and people as inherently threatened. The discursive securitization of diverse threats developed into one of the most powerful discursive structures in the Israeli societal discourse (Fröhlich 2010). Generally speaking, a mentality has emerged which cultivates a perpetual state of siege (Bar-Tal 1998). The water discourse has been taken over by this securitization trend, especially in the face of intense water-related disputes between Israel and Syria in the late 1950s/early 1960s (Amery 2002). The securitization of water and its central role for the Israeli identity is complemented by a quite confrontative assessment of the water situation in the dominant Israeli discourse. The natural water resources in the Jordan basin are considered as scarce and in desperate need to be developed in order to keep the current standard of living of the region's population (Fröhlich 2012; Messerschmid 2012).

Since the 1990s, the discourse partially shifted from water quantity to water quality issues (Fischhendler et al. 2011), while large quantities of additional water became available due to wastewater recycling and desalination (Aviram et al. 2014; Spiritos/Lipchin 2013). Peace treaties

and related water agreements were also conducted with Jordan and the PLO (Zeitoun 2008: 68-72). These develops facilitated a de-securitization of water issues, although this trend was partially countered by heavy droughts in the late 2000s and predictions of climate change-induced rainfall reductions in the future (Mason 2013; Messerschmid 2012). Attempts to achieve more tangible water equality, for instance by conferring parts of the mountain aquifer onto Palestinian control or allowing Palestinians to unilaterally implement water infrastructure projects in the West Bank, remain unsayable (Feitelson/Rosenthal 2012; Selby 2009) and are routinely subjected to what we call a re-securitization: Regardless of the afore-mentioned de-securitization impulses, dominant discourse structures still tie back into the much older, persistent securitizing discourse structures, which can be easily activated (Fröhlich 2012; Messerschmid 2012).

6.4 Israeli-Palestinian water cooperation: the Good Water Neighbours project and discourse

6.4.1 The Good Water Neighbours project

The Good Water Neighbours (GWN) project was initiated by Friends of the Earth Middle East (FoEME) in 2001 with the goal to stimulate local water cooperation between Israeli, Palestinian and Jordanian communities. This cooperation aims at contributing to the conservation and improvement of local, cross-border water resources and initiating contact and collaboration between people from hostile societies, thus increasing mutual trust and understanding (Harari/Roseman 2008). By 2013, 27 communities work with each other under the umbrella of GWN, including nine from Israel, eight from the West Bank, one from the Gaza Strip and nine from Jordan (FoEME 2012). In this study, we focus on cooperation between communities from Israel and the West Bank.

By the time of writing, cooperation in water resource management has not been achieved by any of the Israeli-Palestinian community pairs due to administrative obstacles and lack of political support. However, common activities on issues as diverse as water-related education and awareness raising, the development of cross-border conservation areas, the initiation of water infrastructure projects benefiting both sides, or the prevention of construction works in ecologically and hydrologically sensitive areas have been undertaken (FoEME 2007; Kramer 2008). The hindrance of the construction of the separation wall around Battir, agreement between Baqa al Gharbia and Baqa al Shrakiya to use the new sewage treatment plant in Gharbia jointly, and a stop of the regular flow of sewage from the Israeli settlement Beitar Elite to the fields of Wadi Fuqin are among the most visible outcomes of the GWN project (FoEME 2007; Frehse 2013).

But why are the people engaged with the GWN project showing such cooperative behavior and low willingness to engage in water conflict compared to the national-level Israeli-Palestinian water interaction? If the discursive understanding of socio-environmental conflict and cooperation outlined above is valid, we should be able to explain this by significant differences between the dominant national discourses on both sides and the dominant GWN discourse. This discourse will be analyzed and contrasted with the national Israeli and Palestinian water discourses in the following sections.

6.4.2 Methodology

In order to create the corpus for the discourse analysis, we first collected reports, documents and press releases available on the GWN website. In addition, we conducted 38 semi-structured interviews with 44 activists involved into the GWN project, either as professional staff, as volunteers, or as supporters from the local bureaucracy. Since we wanted to keep the sample as representative as possible, an almost equal number of Israeli (25) and Palestinian (19) activists from five different community-pairs and the national GWN offices in Bethlehem and Tel Aviv was interviewed. In order to single out the influence of discourses, we used the diverse case technique (Gerring 2007: 89-99) when selecting the five community-pairs, i.e. we conducted interviews in communities with great differences in location, size, population structure, history, political affiliation and economic structure. Figure 14 provides an overview of the locations and numbers of the interviews conducted. Communities represented by the same symbol are cooperating with each other (the national offices are marked by a circle).

Figure 14: Locations of the interviews with GWN activists

When analyzing the material, we largely followed the suggestions made by Keller (2013) and complemented them with elements of the Grounded Theory procedure (Corbin/Strauss 2008). We went back and forth between examining the structure of the corpus in order to get an overview as well as to interlink the various parts of the data (macro-analysis), and intensively analyzing particularly representative text passages (micro-analyses) (Jäger 2004: 171-196; Keller 2013: 89-112). The selection of material for the micro-analyses was guided by the previous macro-analyses and by the principles of maximal and minimal contrasting (Keller 2013: 129f.). For both the macro- and the micro-analyses, we utilized the procedures of open, axial and selective coding (Böhm 2012; Glaser/Strauss 1967: 101-115) in order to carve out the interpretative repertoire of the GWN discourse (Keller 2011b: 240-252). Since we conducted parts of the discourse analysis before and during the field research, we were able to apply the idea

of theoretical sampling (Corbin/Strauss 2008: 143-157), meaning that the interview questions and document sighting priorities were adjusted to hypotheses and blind spots which emerged during the preceding (and preliminary) analysis.

The analysis of the GWN discourse was considered saturated when several categories (or codes) relevant for the research question were (a) identified, (b) developed in terms of their relevant characteristics and dimensions, and (c) related to each other (Corbin/Strauss 2008: 148f.). Finally, we shared the preliminary results of the discourse analysis with our interview partners, asked them for feedback ("member check") and carefully reviewed our analysis in case of disagreement (Steinke 2012: 320).

6.4.3 Results

The GWN activists interviewed share a common discourse, although some differences between an Israeli and a Palestinian version can be detected. In this section, this GWN discourse is described along seven categories that emerged as especially relevant during the discourse analysis, namely: relevance of water, water problems, water situation, solution for water problems, out- and in-group images, governments and politics, and local support, resistance and knowledge.

Relevance of water: Just as the dominant national water discourses, the GWN discourse emphasizes the importance of water and thus attributes a high symbolic relevance to the resource. However, the reasons for this high relevance are different. Within the dominant national discourses, water is considered important due to its connections either to Zionism or to a viable state and the *fellah* myth. These references are mutually exclusive, contradictive, and eventually confrontative. This stands in sharp contrast to the GWN discourse. Here, water is first and foremost framed as a means to sustain life in general and human life in particular:

> "The existence of water on the Earth's surface provides our entire world with the most precious gift of all: life. Water is the ingredient that made possible the explosion of life on our planet, both in the sea and on land." (Watercare 2004: 4)

Within the Palestinian GWN discourse, water is in addition described as crucial for sustaining the concrete, often agricultural livelihoods of the people in the region. Within the Israeli GWN discourse, water is also described as an important part of a healthy and livable environment. So despite some differences, all three dimensions of the relevance of water as constructed in the GWN discourse (enabling life, securing livelihoods, raising the quality of life) are clearly non-exclusive since they refer to (benefits for) all inhabitants of the region, regardless their political affiliation or nationality. In this respect, the GWN discourse is considerably less confrontative than the respective national level discourses.

Water problems: The dominant Palestinian water discourse focuses overwhelmingly on problems of water quantity, while in Israel, an essential concern about sufficient water availability is combined

with high (and growing) attention to water quality issues. In the GWN discourse, issues of water quantity and quality are highlighted as well (although Israeli GWN activists tend to emphasize water quality and Palestinian activists water quantity issues). There is agreement that Israelis are facing no water availability problems at the moment, but are threatened by the pollution of cross-border streams and the mountain aquifer. Palestinians are portrayed by the GWN discourse as struck by the same, but more severe problems of water quality and in addition by alarmingly low water availability. The inclusion of water quality concerns into the set of relevant issues broadens the range of topics available for discussion, and thus facilitates cooperation, especially since water quality issues can more easily be framed as a positive-sum game.

When it comes to the reasons for the existing water problems, the GWN discourse first refers to a bundle of geographical and demographic factors (e.g. arid climate, growing population), which is largely in line with the national dominant discourses. Water resources are also portrayed as "highly vulnerable to pollution" (Tagar/Qumsieh 2006: 3). But in addition, Israeli and Palestinian GWN activists agree that Israeli policies are responsible for water problems. The insufficient water availability in the West Bank is largely described as a function of the Israeli control over water resources, the unwillingness of the Israeli government to share the water equally and Israeli restrictions on water projects in the West Bank. In the words of an Israeli GWN activist:

> "Then, unfortunately, we had 1967 another war. And this time, Israel occupied, or take, took over the Westbank, and occupied. And since then, Israeli had no, no intention of letting the Palestinian really survive in a proper, decent way […] To get the pump to a village, to pump water, it will be a procedure of paper work of half a year, or a year, and now the couple of years before they let you do it." (interview 16)

The Israeli government is also held responsible for the water quality problems originating in the West Bank. As a Palestinian GWN activist states:

> "In the Westbank, yes, we have a, problems with, especially with the springs inside the villages. There is deterioration, there is the pollution, mainly because of the lack of sewage systems […] All these sanitation projects require Israeli approval. And in many cases, we have donors willing to put money, we have the budgets, but we lack the Israeli permit to proceed ahead with these projects." (interview 13)

However, it is important to mention an important difference between the Israeli and Palestinian GWN discourses here. Palestinian GWN activists describe the natural scarcity of water and especially Israeli policies as the main sources of water problems in the West Bank. Consequentially, and in line with the dominant discourse on the national level, the responsibility of any Palestinian group or institution for the scarcity or pollution of water in the West Bank is denied. Within the Israeli GWN discourse, by contrast, Israel is described as being better off in terms of water not only because it utilizes water resources from the West Bank, but also because of its high administrative, organizational and technological capabilities:

> "And the, the good thing about it, Israel, is: We always knew how to use the money. They [the first Jews migrating to Israel] were pioneers in the sense that they would not accumulate in their own pocket [...] And as a result, we managed to get our water, among other things, our water system probably one of the most developed in the world" (interview 16)

It can be assumed that the shared understanding of Israeli government policies as responsible for water problems in the region, and especially in the West Bank, facilitates cooperation within the GWN project. However, disagreement regarding the importance of technological and administrative causes of water problems has the potential to hamper cooperation between GWN activists.

Water situation: Although an asymmetry in water-related problems (and capabilities) is recognized, the GWN discourse is characterized by the diagnosis of strong water interdependence between Israelis and Palestinians. This is especially true with regard to the mountain aquifer. An Israeli GWN activist was quite explicit about this when reporting about the benefits of establishing a sewage treatment system in the West Bethlehem region:

> "Because currently, this village, like all the, the other villages, they are actually polluting their own water [...] But the Israeli mayors will also want that the sewage issue will be dealt with, because Israel also drinks from that same water. So, I think all of our work, the strength of our work, we are identifying self-interest [...] And we are identifying that self-interest in a, in a manner that speaks to mutual gain." (interview 12)

The identification of water interdependence, self-interests and mutual gains in combination with the depiction of water resources as naturally scarce and vulnerable provides strong argumentative support for water cooperation. This support is largely absent in the dominant discourses on both sides, which portray water interaction largely as a zero-sum game[35], thus denying the possibility of mutual gains.

Solution for water problems: When it comes to the question as to how the water problems in the region can be solved, the GWN discourse favors a solution based on two principles. First, Palestinian water rights have to be acknowledged and regional water resources should be shared in a more equal way. Second, following the ideas of strong water interdependence, water as the object of a positive-sum game and lack of coordination as a possible source of water problems, a transnational integration of water resource management is promoted. This management is envisaged to be carried out by a bi- or trilateral[36] water commission in which all parties would have the same rights and duties. As a contrast to the current Israeli-Palestinian Joint Water

[35] One might argue that recent developments in wastewater recycling and desalination facilitated a shift in the Israeli discourse towards conceiving water no longer as a zero-sum game. While such a shift is visible with regard to Israeli-Jordanian water interactions (Aviram et al. 2014), it has so far not been observed in the Israeli-Palestinian water relationship (Feitelson/Rosenthal 2012). Giving Palestinians more control over or access to shared water resources is still deemed wrong in the dominant Israeli discourse because such a move is depicted to undermine Israeli water security (Fröhlich 2012).

[36] Most GWN activists advocate an integrated management of the water resources of Israel, Palestine and Jordan.

Committee, the commission would be responsible for all, or at least for all transboundary water resources in the region.

This desire to share water resources more fairly and to manage them as integratively as possible clearly provides a positive vision that is highly supportive of cooperative behavior. It also provides a clear contrast to the dominant national water discourses on both sides which clash over the recognition of Palestinian water rights and are more concerned with the allocation (and, in Israel: quality) rather than with the common management of water resources.

Identities and out-group images: Within the Israeli GWN discourse, Palestinians are mostly described in positive and empathic terms. They are usually not referred to primarily as Palestinians, but as neighbors and fellow humans. Sometimes, the boundaries between both identities are even blurred symbolically, for instance when Israelis and Palestinians are said to be "all son of the earth" (interview 9). Following this logic, many of the Israeli government's measures which complicate the lives of Palestinians from the West Bank, such as the system of checkpoints, the construction of the wall or the lack of permits to work in Israel, are criticized.

But Palestine is also portrayed as a place of corruption, clientelism, lack of work ethos, and at times even of insecurity. This insecurity is described as being caused by extremists who resist any kind of Israeli-Palestinian cooperation. A good example of these aspects of the Israeli GWN discourse is provided by the following quote:

> "So, the Palestinians have a very difficult, have a very big difficulty to operate construction plant for sewage, sewage construction plant. They do not have the, the culture for this, the habit for this, they do not have the how to, to collect taxes to maintain the, the projects. And they do not have the, the motivation to do it." (interview 29)

Another aspect of the Israeli GWN discourse is the description of Palestine as an underdeveloped country:

> "Yah, and they are less developed economically. So, you know the, all the dealing with environmental issues is parallel to economic situation. As much as your situation is good, you, you are free to deal with the environmental things." (interview 6)

The meaning of this development frame is ambiguous. On the one hand, it constitutes another distinction ("developed-underdeveloped") which constructs Israelis as superior to Palestinians. On the other hand, it implies that the water management problems observed cannot be read as an indicator for a supposedly negative Palestinian character trait. Rather, these problems are depicted as typical for poor countries which either lack capabilities or opportunity to improve their water situation.

The Palestinian GWN discourse is characterized by a clear-cut division of the Israeli out-group. The Israeli *people* are positively described as neighbors who deserve to "live in freedom, security, peace and respect" (interview 20). Especially for the period prior to the onset of the second Intifada in 2000, relations between Israelis and Palestinians are described as tight and mutually

beneficial. However, the Israeli *government* and *settlers* are portrayed as ruthless, fanatic and seeking purely their own advantage:

> "There are good people in Tzur Hadassah and the people of Wadi Fuqin want to be connected. They do not want to be separated […] The people I know, I am happy and I want to work with them 100 years more […] Netanjahu and his government are very, very difficult and they do not want peace." (interview 19)

The fact that Israel is a democracy and that the government (and its settlement policies) are elected by the majority of the Israeli people is not reflected in the Palestinian GWN discourse.

It can be concluded that the Israeli and Palestinian GWN discourses contain a predominately (but not completely) positive image of the out-group, especially compared to the respective national-level dominant discourses (e.g. Bar-Tal 1998; Kaufman 2009). This largely empathic construction of the "other" as neighbors, humans and partners is obviously a facilitating condition for water cooperation.

Governments and politics: As already indicated, the Israeli government is portrayed in negative terms by the GWN discourse. It is depicted as ruthless and heavily biased. Concrete allegations include the occupation of the West Bank, the settlement policies and the construction of the separation barrier, but also the unequal distribution of water, the ignorance of water pollution problems and the preferential treatment of Israeli agriculture. The construction of a common negative "other" facilitates the development of a shared identity. The Palestinian Authority, in contrast, is either described as supportive and helpful (Palestinian GWN discourse) or as lacking capabilities (Israeli GWN discourse). The absence of Palestinian critique of the Palestinian Authority represents a contrast to the Israeli GWN discourse, which also blames the Palestinian side as responsible for the water problems occurring within their territory. This is in line with the disagreement about the causes for water problems in the West Bank between Israeli and Palestinian GWN activists and the partially negative out-group images in the Israeli GWN discourse, thus representing a potential obstacle to cooperation.

Politics in general is described as a predominantly negative realm (also in Palestine, where the evaluation of the government is quite positive). According to the GWN discourse, political activities are often inspired by a top-down approach, which is less effective and ignores local realities. Related to that, politicians are described as not knowing or not even caring about the lives and thoughts of "normal" people. Rather, they are pursuing goals motivated by ideology or the interests of some particular groups. In the words of a Palestinian GWN activist:

> "The politicians do not know really what is going on ground. Really, they do not know […] Whether they are the small-rank or the high-rank, have lost the feelings. When they become politicians, they lose the feeling of simple or normal humanitarian, or human, humanity." (interview 33)

It is likely that the appreciation of bottom-up approaches as well as skepticism about the established political actors' willingness and capacity to solve water problems provides a motivation for the GWN activists to engage in cooperative problem solving.

Local support, resistance and knowledge: Within the GWN discourse, the local surroundings are described as supportive of the project and its activists. The Israeli interview partners usually mention a large number of passive bystanders as well as some supporters in their communities, but deny the existence of active resistance. In Palestinian GWN discourse, it is reported that at the beginning, people in the local communities were skeptical about the water cooperation. But this resistance is described as having transformed into support over time. Either local residents were convinced by the concrete benefits the GWN project brought to them, or GWN activists persuaded other members of their communities personally:

> "Indeed, there were some people that are, that were saying that [a local GWN activist] is talking with the Jews, is working with the Jews. And I went to them and said that these Jews are helping the village and it is very important and I am not, I am not hiding it [...] I convinced them." (interview 19)

This description of local support for the project also strengthens two other elements of the GWN discourse identified above. Firstly, it underscores the negative depiction of politicians as out of touch with local realities, since they have been unable to implement widespread water cooperation despite the fact that local support exists or could be generated. Secondly, the claim that Palestinians were convinced of concrete benefits of the GWN project underscores the character of water interaction as a situation of interdependence and as a positive-sum game.

Furthermore, the GWN discourse depicts the knowledge about environmental and water issues within Israel and Palestine as rather low (at least before local GWN projects started). This even applies to very local water problems. The GWN activists therefore describe themselves as environmental pioneers and knowledge mediators who educate local people about the environmental hazards they face. These positive identities constructed by the GWN discourse as well as the description of a supportive social environment are likely to raise the motivation and willingness of the activists to engage in further cooperation.

6.5 Conclusion

In this study, we have shown that the Israeli-Palestinian water conflict is driven by confrontative and mutually exclusive discourses, while largely (although not completely) cooperative and mutually benevolent discourses which foster water cooperation exist at the same time and within the same setting. These findings provide strong evidence for the discursive understanding of socio-environmental conflict and cooperation outlined above. One might argue that the respective discourses are not a facilitating factor for, but rather an outcome of cooperative

behavior between the GWN communities. We regard this as unlikely because discourses structure how people essentially conceive the world (and consequentially act towards it). Moreover, they are historical phenomena that only change slowly over time. In line with this, groups are very unlikely to cooperate with worldviews and motivations as confrontative as the ones we have identified in the Israeli and Palestinians dominant discourses. Thus, our research suggests that the discursive construction of the identities and situation assessments of Israelis and Palestinians have a higher explanatory power with regard to the occurrence of socio-environmental conflict or cooperation than the actual physical or material realities.

To name just one example from the analysis presented above: The same physical water reality is depicted as a zero-sum game in the national discourses and as a situation of interdependence and possible mutual gains in the GWN discourse. These different discursive constructions influence the respective actors' behavior either to perpetuate conflict or to initiate cooperation. Consider the cooperation between Tzur Hadassah (Israel) and Wadi Fuqin (West Bank): Construction activities as well as the lack of sewage solutions put stress on the shallow aquifer below Wadi Fuqin and thus endanger the main source of irrigation water for the village. Although a local hydrologist confirmed to us that the "Wadi Fuqin aquifer" is quite narrow and not connected to Israeli groundwater sources (Haviv 2013), residents of Tzur Hadassah still describe water interdependence as one of their motivations for cooperation:

> "First of all, geologically, it [the sewage] contaminating the […] groundwater. […] It is not only the village problem. On the very immediate results, the village springs will be ruined. But no doubt, that is only the beginning. We all live from that, the same groundwater. It is all connected." (interview 15)

So if conflict or cooperation over natural water resources in Israeli and Palestine can best be explained by analyzing the underlying discourse structures, attempts to find an accepted and sustainable solution to the water conflict should focus on those discourse structures, too. It was John Vasquez (1997: 672) who wrote that an analysis which is based on the discursive construction of reality has to assume, by its very own logic, that war (or unconstructive conflict in general), since it has been created by mankind, can also be "de-created" or even extinguished by us. Thus, conflicts can be transformed when the respective viewpoints and interests are changed in a way that makes them compatible (Buckley-Zistel 2006; Diez et al. 2006). It may be feasible to develop and apply tools of "discursive conflict transformation", which alter discourse structures in a way that lessens confrontative identities and situation assessments and opens up ways to cooperate in spite of conflict lines which have developed over decades. A starting point for such a program of discursive conflict transformation is provided by the work of Ochs et al. (1996: 109), who suggest that the ability of practices to produce socially significant re-framings of dominant discourses emerges from the process of co-narration:

> "Audiences […] co-own the narrative as an interactional product and […] share control over cognitive and verbal tools fundamental to problem solving itself. Co-ownership […] involves sharing control as well as a commitment, however temporary, both to the activities of co-narration and collaborative problem solving and to the product, that is, the story."

Positive re-framings of confrontative discourses can be induced by a variety of actors on all levels of society, including schools, universities, civil society, NGOs and government institutions. As we have shown above, the GWN activists have largely transcended the confrontative discursive structures which facilitate the Israeli-Palestinian water conflict and have replaced them with identity constructions and situation assessments which favor cooperative behavior. The resulting cooperation can hardly be explained by focusing on non-discursive factors, thus providing support for Lene Hansen's (2006: 214) claim that „[i]n short, 'facts', 'events', and 'material factors' did not in and of themselves produce policy."

7 Conclusion

"We shall not cease from exploration,
and the end of all our exploring
will be to arrive where we started
and know the place for the first time."
- Thomas Stearns Eliot, *Four Quartets* -

Eliot's quote is a very useful metaphor to describe the findings of this dissertation. After three years of research, in the office and in the field, it might seem as if I just arrived where I started. Qualitative case study and quantitative regression analysis, usually inspired by a positivist epistemology and a rationalist-objectivist ontology, are still the dominant methods in the research on climate change and violent conflict (chapter 2). Their limitations and shortcomings have been pointed out throughout the dissertation, but no "silver bullet method" could be identified and no findings were presented that completely reject the validity or applicability of these methods. Similarly, I can draw no definite conclusion on the existence of a link between climate change and violent conflict, the relevance of climate change vis-à-vis other causes of violent conflicts, or the causal pathways and scope conditions which mediate such a link. Not surprisingly, much more research on these issues by scholars from different disciplinary and theoretical backgrounds is clearly needed.

But in the sense of Eliot, the findings presented in the preceding chapters and summarized in this conclusion help to determine the current state (place) of research on climate change and violent conflict, to acknowledge its potential and shortcomings, and to pave the way for future explorations. More specifically, I examined the strengths and weaknesses of the methods currently applied in the research field, and explored new methodological avenues which, despite having their own deficits, can address the shortcomings of the established methods. Furthermore, I highlighted the importance of context factors and of non-material factors for the transition from socio-environmental conflict to violence (but also to cooperation). The findings regarding both of these central issues of the dissertation, as well as their implications for future research, are now discussed in greater detail.

7.1 Substantive findings: conflict, violence, context and non-material factors

There is near consensus around the claim that if climate change increases the risk for violent conflict onset, then the scarcity of renewable resources is a crucial causal pathway.[37] Similarly, there is little doubt about the importance of context factors and intervening variables (Buhaug et al. 2010; Raleigh et al. 2014; Scheffran et al. 2012b; Schilling et al. 2014; WBGU 2008). Recently, several regression analyses have taken this into account and included interaction effects, e.g. between drought and political/economic marginalization, into their analyses (Fjelde/von Uexkull 2012; Theisen et al. 2012). But the number of interaction terms which can be used in a regression analysis is limited (Vis 2012). Other studies have produced lists of potentially relevant context factors, but not analyzed their (potential) interactions or relevance beyond specific regional contexts (e.g. Benjaminsen et al. 2012; Carius et al. 2006; Nyong 2007; Schilling et al. 2012). In order to address these shortcomings, I have conducted a fuzzy-set Qualitative Comparative Analysis (fsQCA), in order to determine the conditions under which conflicts over scarce renewable resources turn violent. The findings were presented in chapter 4 and suggest that the simultaneous presence of negative othering, low power differences and recent political change is a sufficient condition for the violent escalation of such conflicts.

Regarding the combination of conditions identified as sufficient, several aspects seem interesting. Firstly, despite opposing claims by some political ecologists (Allen 2013; Jewitt 2008) and historical materialists (Selby/Hoffmann 2014), the external appropriation of renewable resources is not linked to the violent escalation of conflicts over these resources, although it contributes to the existence of such conflicts and related forms of structural violence. This is confirmed by the case of Loitoktok (Kenya) discussed in chapter 3, where national parks and tourism schemes contribute to local tensions, but also provide jobs and discussion forums (see also Ngaruiya/Scheffran 2013). Secondly, it seems that low power differences - and not large power differences which are often associated with exclusion, marginalization and discrimination (Fjelde/von Uexkull 2012; Kahl 2006; Reuveny 2007) - increase the risk of violent conflict over renewable resources. This is indirectly confirmed by the analysis of the Israeli-Palestinian water conflict in chapter 5, which did not turn violent in recent decades and which is characterized by tremendous (and widely acknowledged) power differences (see also Zeitoun 2008). Thirdly, a non-material factor, namely negative othering, has been identified as a crucial INUS condition for the violent escalation of conflicts over renewable resources.

[37] Natural disasters and migration are two other crucial causal pathways (Buhaug et al. 2010; WBGU 2008). But while the role of natural disasters in causing violent conflict is still heavily debated in the literature (e.g. Berrebi/Ostwald 2011; Nel/Righarts 2008; Slettebak 2012), there is increasing consensus that migration should be considered as a form of adaptation rather than as a source of violent conflict (McLeman 2013; Warner/Afifi 2014).

This last result resonates very well with the findings of the in-depth study of Israeli-Palestinian water conflict and cooperation presented in chapters 5 and 6. In chapter 5, I showed that the existence of a water conflict between Israel and Palestine cannot be explained by hydrological "facts", the economic importance of water and seemingly "rational" interests. Rather, confrontative and mutually exclusive water discourses on both sides are a central driver of the conflict. The discursively constructed assessments of the relative strength of the other side and of the potential water-related gains which are available when using violence can also explain the non-violent character of the Israeli-Palestinian water conflict. The importance of discourses as non-material factors was underscored in chapter 6. There, I discussed why Israeli and Palestinian communities engage in cross-border water cooperation under political, economic, historical, geographic and ecological circumstances very similar to those in the respective national contexts or in numerous other communities along the shared border which do not cooperate. Dominant discourses, in this case the discourse of the activists of the Good Water Neighbours (GWN) project, were identified as a crucial factor for explaining inter-group water cooperation.

In a recent analysis of water-related violent conflicts in the Sudans, Selby/Hoffmann (2014: 3) write:

> "The extant literature almost always analyses whether and how environmental changes […] or increases in demand […] determine or contribute to conflict. But this overlooks the possibility that resource-related conflicts can occur without any change in, or irrespective of, supply-demand balances, for instance through the rise of new ideologies, policies or political and economic structures which result in the resources in question being deemed more valuable and conflict-worthy than hitherto."

This confirms the relevance of discourses and suggests promising ways for future research on climate change and violent conflict. Discourses structure how individuals and social groups perceive environmental changes and attribute meaning to them (chapter 5). This implies that changing discursive constructions of renewable resource scarcity or environmental change can lead to transformations from inter-group cooperation to conflict to violence and vice versa, independent of physical changes in resource assets, climatic conditions and power capabilities. This is illustrated by the evaluation of the risk index presented in chapter 3. In both Karamoja (Uganda) and Southern Turkana-Pokot North (Kenya), interviews with local inhabitants and key informants suggest a decline in the amount and reliability of precipitation, which is linked to an increase in violent conflict intensity and frequency (see also Bevan 2008; Ember et al. 2012; Jabs 2007; Schilling et al. 2012). However, the local perception of declining and more variable rainfalls is contradicted by satellite data, which suggest few changes in the average precipitation patterns in recent years. For future research, it would be interesting to investigate the interplay between physical environmental changes or scarcities and their perceptions or discursive constructions,

and the relevance of this interplay for conflict and cooperation dynamics, across several cases (and compare them, probably by using QCA).

But the research presented in the preceding chapters indicates that material (context) factors are also important in mediating the link between climate change and violent conflict. As discussed above, the QCA presented in chapter 4 highlights the importance of low power differences and recent political change (next to negative othering) for the violent escalation of conflicts over scarce renewable resources. This supports recent claims by other studies that research on socio-environmental conflicts or the relationship between climate change and violent conflict needs to be more sensitive to power relations (Gemenne et al. 2014; Houdret 2012; Zeitoun 2008). Future research could, for instance, develop adequate indicators or datasets for power differences between social groups[38], which can be used in regression analyses and medium-N comparative studies, or investigate how changes in power differences influence the risk of the violent escalation of socio-environmental conflicts (see Gilpin 1987 for a related debate in International Relations). The relevance of recent political change should also be investigated in greater detail by future studies: Are interaction terms between political changes and climatic (or other environmental) changes robustly and significantly correlated with violent conflict onset? Do different types of political change - e.g. political system change vs. resource regime change or national level change vs. regional/local level change - have different impacts on the occurrence and violent escalation of conflicts related to environmental/climate changes? And how are climate change, political change and (violent) conflict causally related (Hsiang et al. 2013; Kahl 2006; Scheffran et al. 2014)?

The GIS-based risk analysis presented in chapter 3 provides further insights into the relevance of context factors for a potential link between climate change and violent conflict. The factors used as indicators for vulnerability to climate change and for general risk of violent conflict onset strongly increase the ability of the CRI to predict the risk for violent conflict onset (not to be confused with climate change-related violent conflict onset). Several of these vulnerability and conflict risk indicators are related to the INUS conditions for the violent escalation of conflicts over renewable resources discussed in chapter 4. This is especially the case for recent political instability (related to negative othering and recent political change) and medium level of democracy (related to low power differences and recent political change). Low levels of education and bad health (as an indicator for low levels of development) were also used as vulnerability indicators in chapter 3 and found to increase the risk for the violent escalation of resource conflicts in chapter 4. Although a growing literature on these context factors exists (e.g.

[38] An Ethnic Power Relations dataset exists (Cederman et al. 2010), but it only focuses on differences in access to executive power between ethnic groups and does not focus on other forms of power (e.g. financial, military) or other forms of social groups (e.g. classes, political constituencies).

Bretthauer 2014; Gioli et al. 2013; Meierding 2013; Ngaruiya/Scheffran 2013; Vivekanada et al. 2014; Yang et al. 2014), their interactions and specific relevance for the relationship between climate change and violent conflict (but also cooperation) remains to be explored in greater detail.

At least for Kenya and Uganda, it was found in chapter 3 that the indicators for vulnerability vis-à-vis environmental change are good predictors for the onset of violent conflict and indeed strongly overlap with the indicators for general violent conflict onset risk. This poses a problem for the research on natural disasters and violent conflicts: If the occurrence of natural disasters is accompanied by more violent conflicts, is this an indicator for a disasters-conflict link, as some authors argue (e.g. Drury/Olson 1998; Nel/Righarts 2008), or is this pattern driven by some underlying factors which make both the transformation from natural hazards to natural disasters (high vulnerability) and the onset of violent conflict more likely?

I will now summarize the findings of this thesis, with regard to the second central research question as outlined in the introduction:

Q2: Is climate change a cause or trigger of violent conflicts? If so, which contextual factors are particularly important, how can the transition from conflict to violence (or cooperation) be explained, and how relevant are immaterial factors?

Although this debate is far from settled (chapter 2), two findings of my dissertation are in line with several recent studies (e.g. Fjelde/von Uexkull 2012; Hsiang et al. 2013; O'Loughlin et al. 2012; Raleigh/Kniveton 2012) in that they indicate the existence of a link between climate change and violent conflict. Firstly, the fsQCA suggests a causal pathway connecting renewable resource scarcity to violent conflict escalation which is very robust and backed by existing theoretical evidence. Such a finding is highly unlikely if no link exists between renewable resource scarcity, which is predicted to increase with enduring climate change, and the violent escalation of conflicts over these resources (Berg-Schlosser/de Meur 2009; Schneider/Wagemann 2012: 284-295). Secondly, the positive and significant correlation between the indicator for environmental exposure and small-scale violent conflict onsets, as well as the case study findings from Karamoja and Turkana presented in chapter 3, suggest that climate change has an impact on the risk for violent conflict onset.

However, while more evidence is clearly needed to verify (or falsify) the existence of a link between climate change and violent conflict, my research provides strong support that such a link is highly dependent on contextual factors and scope conditions. In this respect, one should be aware that factors which contribute to conflict onset (e.g. the external appropriation of scarce renewable resources) are not necessarily identical to those facilitating the violent escalation of such conflicts. Certain material context factors, such as low levels of development and education,

low power differences, recent political change and past political instability, were identified as highly relevant for the occurrence of violent conflict related to climate change. The same applies to immaterial factors like negative othering or discursively constructed identities and situation assessments. Since human perceptions of environmental and social conditions are discursively constructed, it is even possible that violent conflicts related to environmental stress occur if seemingly "objective" physical and economic data indicate the absence of environmental stress.

7.2 Methodological findings

Three methods have been empirically applied in this dissertation, namely GIS-based risk analysis, QCA and discourse analysis. I will now discuss their potential and pitfalls and compare them with each other as well as with case study and regression analysis, which are the most-widely used methods in the research on climate change and violent conflict. The aim of this dissertation is not to contribute to the general debate on quantitative and qualitative methods, which has been going on in the social sciences for decades (see e.g. Bennet 2004; Hedström 2005; King et al. 1994; Mahoney/Goertz 2006; Ragin 1987). The general advantages and disadvantages of the five methods are therefore discussed in a relatively short manner in chapter 7.2.1. In line with Gerring's (2012: 81) premise that "it is difficult to evaluate a given work in isolation from the field of studies in which it is situated", the five methods are afterwards evaluated more thoroughly with regard to the substantive findings of this thesis (chapter 7.2.2) and the characteristics of the research field climate change and violent conflict (chapter 7.2.3).

7.2.1 General discussion on methods

Various schemes have been developed in the social sciences to describe and discuss the advantages and disadvantages of different research designs and methods. The most common scheme consists out of three elements: reliability/precision, reproducibility and validity, while the latter can again be divided into internal validity, external validity and construct validity (Bryman 2012: 45-78; Gerring 2012: 80-103; Steinke 2012).

According to Gerring (2012: 82), "the closeness of these results [of various tests using the same procedure] to each other would capture the precision" or *reliability* of a test. This is closely related to one of the two components of *reproducibility*, which is understood as the degree to which a subsequent study is able to replicate the findings of a previous study. Both, reliability/precision and the first component of reproducibility, can only be discussed with regard to specific research designs and/or empirical results, but not with regard to research methods per se.

The second component of reproducibility (sometimes also termed transparency) is the extent to which other researchers can understand and replicate how and through which procedures a

scientist produced a certain finding or conclusion. Regression analysis and GIS-based risk analysis are characterized by a high reproducibility in this sense (Braumoeller/Sartori 2004). Researchers usually spell out in detail which datasets, models and formulas they use to reach a certain conclusion (e.g. chapter 3 or Busby et al. 2013; Salehyan/Hendrix 2014). The creation of the datasets utilized is described by codebooks, which also provide definitions of major concepts (e.g. Salehyan/Hendrix 2012; Sundberg et al. 2011; Tollefsen 2012). Qualitative studies, by contrast, are not forced to define their key concepts with a similar degree of precision, although they often do. However, Scheffran et al. (2014: 371) recently criticized that many qualitative "studies on the link between environmental or climate change and violent conflict often do not explicitly define concepts of conflict or violence."

In contrast to regression analysis and GIS-based risk analysis, discourse analysis requires researchers to become very familiar with the relevant contexts and materials and to provide 'thick' interpretations of the discourses under investigation. This limits the reproducibility of the analysis (Beck 2010), although guidelines and strategies have been developed (and applied in chapters 5 and 6) to reduce these problems (Glaser/Strauss 1967; Keller 2013; Rathbun 2008). The same is true for case studies, although they have also developed procedures to increase the reproducibility of their analyses (e.g. George/Bennett 2005; Glaser/Strauss 1967; King et al. 1994) and can work in standardized ways with quantitative data in some instances (Brady 2004). However, few researchers would doubt that the conduction of semi-structured interviews or the textualization of participatory observations is as reproducible as the conduction of a regression analysis with R or the fusion of spatial layers with ArcGIS, for example. With respect to reproducibility, QCA represents a middle way. The analysis of the data matrix and truth table with the help of standardized algorithms and the respective software can easily be reproduced by other scholars. But the calibration of the data matrix usually requires "theoretical knowledge, as well as a deep knowledge of the empirical field" (Berg-Schlosser et al. 2009: 7), which cannot be made transparent or acquired through standardized procedures.

Internal validity concerns the degree to which the conclusion (particularly if it concerns a causal relationship) of an analysis is plausible, especially vis-à-vis competing explanations. Qualitative methods, such as case study or QCA, are usually associated with a high degree of internal validity since they can describe relevant factors, trace causal chains and rule out competing explanations in great detail. The same is also true for discourse analysis, although it faces problems in ruling out competing explanations based on material factors (see chapters 5 and 7.2.2). Regression analysis can face interpretation problems when moving from diagnosing correlation to claiming causation. From a pure statistical model, one cannot derive which factors are driving a given correlation (or its absence), especially given problems with concept validity and data reliability

(see chapter 2 and below). In the words of McKeown (1999: 172), "we do not have an adequate explanation of the phenomenon under study until we can say why the model works" (see also Sambanis 2004). GIS-based risk analysis, if conducted in an appropriate manner, is based on the cumulated knowledge produced by earlier research on a subject, which indicates a relatively high internal validity. But this statement has to be qualified in two respects. Firstly, research on climate change and violent conflict is still at an early stage and has as yet produced few consensual findings. Secondly, research on climate change and violent conflict suffers from severe problems regarding the availability, quality and reliability of data which can be used for GIS-based risk analysis (chapters 2 and 3).

External validity "is concerned with the question of whether the results of a study can be generalized beyond the specific research context" (Bryman 2012: 47). A commonly used synonym for external validity is thud generalizability. Discourse analysis usually investigates and highlights very time- and location specific statement practices. This ideographic approach results in a low external validity. Unless specific procedures for selecting cases from a larger population are applied (e.g. selecting typical or crucial cases) (Flyvbjerg 2006; Gerring 2008; Gerring/Seawright 2007), the external validity of case studies is also low due to the fact that they are mainly concerned with one or few cases. This provides a limited basis for making statements about a wider population. GIS-based risk analysis also tries to analyze the spatial distribution of risk factors in a specific region for a particular time period, which limits its ability to make more general claims. QCA, by contrast, can focus on a medium number of cases, which can be selected in order to keep background variables as homogenous and the configurations studied as heterogeneous as possible (Berg-Schlosser/de Meur 2009). A QCA conducted in this way is able to make statements which are valid beyond the specific cases studied. But the method commonly considered as having the highest external validity is regression analysis because its inferences are usually backed up by a large number of cases with significant variation on the dependent and independent variables.

The degree to which indicators actually measure the theoretical concept under study is commonly termed *construct validity* (Bennet 2004: 95; Gerring 2012). Regression analysis and GIS-based risk analysis often face difficulties in operationalizing concepts in an adequate and reliable manner over a large number of cases with the help of large datasets. Examples of this are democracy/autocracy indices, whose reliability and exogeneity have been intensively debated in recent years (Pemstein et al. 2010; Vreeland 2008), and power relation datasets (Cederman et al. 2010), which have difficulties in measuring relational and ideational power detached from concrete local contexts (Farnum 2014; Zeitoun 2008). Case studies, by contrast, can adapt their concepts to local conditions and are therefore usually associated with high levels of construct

validity (Bennet 2004). Discourse analysis focuses on how social groups inter-subjectively construct and perceive reality which, in combination with the requirement that the researcher has to be very familiar with the context of the analysis, also ensures a high degree of construct validity. The same can be said for QCA. The calibration of the data matrix requires the researcher to become familiar with the cases under investigation, which is a crucial precondition for choosing the indicators which best operationalize a given theoretical concept in a particular context (Schneider/Wagemann 2012: 32-41). However, when compared to discourse analysis and case study, QCA has to homogenize calibration procedures for a medium number of cases. This increases the potential misfit between the theoretical concept and the indicator representing it for individual cases and therefore indicates slightly lower construct validity.

Table 6 summarizes the strengths and weaknesses of the five research methods discussed with regard to general quality standards for good research.

	regression analysis	**case study**	**GIS-based risk analysis**	**QCA**	**discourse analysis**
reproducibility	++	-	++	()	-
internal validity	-	++	()	++	()
external validity	++	-	--	+	--
construct validity	-	++	-	+	++

Table 6: Suitability of the different methods for fulfilling general research quality standards

++ very high suitability; + high suitability; () medium suitability; - limited suitability; -- low suitability

7.2.2 Conflict, context, immaterial factors, space and methods

This dissertation has highlighted the *relevance of context factors* in the research on climate change and violent conflict, such as low power differences, recent political change or instability, or low levels of education (see also Buhaug et al. 2010; Homer-Dixon 1995; Salehyan/Hendrix 2014). Case studies, understood as the intensive investigation of one or a few cases, are principally well-suited to assess complex causal pathways and to evaluate the relevance of scope conditions for a given outcome. Regression analyses, by contrast, have difficulties grasping causal pathways if these are dependent on the presence of (combinations of) context factors. Recent studies have tried to solve this problem either by producing subsets of their samples (e.g. all countries which are less developed and highly dependent on agriculture) or by using interaction terms (e.g. between droughts and political marginalization) (Fjelde/von Uexkull 2012; Salehyan/Hendrix 2014; Theisen et al. 2012). But the statistically justified confidence in the results, one of the most important strengths of regression analysis, rapidly declines if the subsets become too small or if too many interaction terms are used (Vis 2012). The number of control variables which can be

meaningfully used in a regression analysis is also limited (Achen 2005), while data on many relevant context factors are either not available or suffer from quality, resolution and reliability problems (chapters 2 and 3). GIS-based risk analysis as a method faces the same data problems (chapter 3). However, the possibility of joining different data layers with various spatial references enables researchers to use a broad range of context factors in the concrete research endeavor. Since it does not aim at uncovering causal relations in a statistical sense, GIS-based risk analysis can (in contrast to regression analysis) include a large number of (interacting) variables or focus on relatively small subsets of the respective population.

The number of conditions (the QCA-equivalent to independent variables), and thus the number of context factors, which can be considered in a QCA is limited. For an analysis with five conditions (e.g. one measure of climate change/environmental degradation and four context factors), one would need at least twenty cases to get reliable results (Marx/Dusa 2011), while some more are usually recommended (Schneider/Wagemann 2012: 151-177). Since "familiarity with cases is a requirement before, during, and after the analytical moment of a QCA" (Schneider/Wagemann 2010: 400) and time and resource constraints limit the number of cases a researcher can get familiar with, a QCA can usually not take more than three to five context factors into account. But besides this limitation, it has been shown in chapter 4 that QCAs are highly suitable for analyzing complex causal relationship which are dependent on scope conditions and (potentially) characterized by conjunctural causation and equifinality. This is a clear advantage vis-à-vis regression analyses and GIS-based risk analyses, which assume an additive relationship between independent variables and cannot account for factors that increase the risk of violent conflict in some contexts, but reduce it in other contexts (Vis 2012).

Non-material factors, and especially discourses, identities and situation assessments, were identified as crucial for understanding the potential links between climate change, resource scarcity and (violent) conflict in chapters 4-6. It was also shown that the SKAD developed by Keller (2011b) is theoretically and methodologically highly suitable for analyzing dominant and alternative discourses and the confrontative or cooperation-prone identities and situation assessments they (re-)produce. But these advantages come at a price. Firstly, at a practical level, the analysis of a corpus of statements is very time intensive, and in order to generate such a corpus on local level conflicts or cooperation, field interviews are usually necessary. Secondly, and more relevantly, Keller's ontological pragmatism allows researchers, in line with political ecology's emphasis on "the simultaneity of symbolic and material struggles" (Peluso/Watts 2001: 30), to take non-material as well as material (context) factors into account. But Keller (2013: 61) does not specify how exactly a researcher can consider "the material quality" of the world if "everything we [humans] perceive, experience, sense is mediated through socially constructed and typified

knowledge". This epistemological inconsistency is even more pronounced in other discourse analytic studies of socio-environmental conflicts (e.g. Zeitoun et al. 2013). MacKinnon (2010) has recently proposed resolving this inconsistency by drawing on critical realism in the tradition of Bhaskar (1997), but more research on this issue is clearly needed.

As has been shown in chapter 4, QCA as a method can take non-material factors like negative othering into consideration. However, information about such factors needs to be available or collected by the researcher for several cases, with the latter option being very labor-intensive. Quantitative methods, such as regression analysis or GIS-based risk analysis, have enormous difficulties including non-material factors since it is not feasible and often not even possible to collect comparable data on them for a larger number of cases (chapters 2, 3 and 5). Applying such methods in small-N research designs is usually not very meaningful because many observations are necessary to generate statistically sound findings or to play out the strength of GIS-based risk analysis in visualizing, summarizing and comparing data (Braumoeller/Sartori 2004; Gleditsch/Weidmann 2012). Proxies on which data are available, such as ethnic marginalization (e.g. Theisen et al. 2012) and past political violence (e.g. Busby et al. 2013) for negative othering or confrontative identities, have been shown to be not very satisfying (chapters 3-5). For instance, there can be very significant grievances between identity groups which do not result in (recorded) events of political violence for long time periods, as has been shown by the recent events in eastern Ukraine (Dunn/Bobick 2014). Finally, case studies are well-suited for taking non-material factors into account (e.g. Martin 2005; Selby 2009; Timura 2001), but have to overcome the positivist-rationalist bias discussed in chapter 5.

This dissertation has discussed the *transition from non-violent to violent conflict*, but also to cooperation in the course of socio-environmental conflicts (which are expected to increase in frequency and intensity due to climate change). Although not much attention has been paid to this issue yet (Engels/Chojnacki 2012), case studies are well-suited to describe and explain the consecutive phases of escalation and de-escalation of a given conflict through process tracing (Checkel 2008). The discourse analyses conducted in chapters 5 and 6 have also showed how discourses can explain the existence of non-violent water conflict as well as sustained water cooperation in the context of a larger conflict. Other researchers have traced the development of water discourses over longer time periods in order to explain the severity of water conflicts (Feitelson 2002; Fröhlich 2010). Thus, despite its problems considering material factors, there can be little doubt that discourse analysis can fruitfully be applied to gain a deeper understanding of the relationship between conflict, violence and cooperation under changing climatic conditions. The same is true for QCA, which has been used in chapter 4 to show that some factors (e.g. external resource appropriation) increase the risk of conflict, but not violence over scarce renewable resources,

while other factors (e.g. low power differences) increase the likelihood that such conflicts will escalate violently. QCA can be used to investigate complex causal relationships, characterized for instance by equifinality and INUS conditions. This is a clear advantage since recent research suggests that the transitions from socio-environment cooperation to conflict to violence and vice versa are complex and can happen through various pathways (Scheffran et al. 2012d; Stetter et al. 2011).

Regression analysis and GIS-based risk analysis are also eligible to investigate the transitions between conflict, violence and cooperation. They can map or investigate the factors which (are hypothesized to) increase the risk that a conflict passes a certain threshold of (de-)escalation, for example one, 25 or 1.000 battle-related deaths per year (Gleditsch et al. 2002). Important tasks for future research in this context are, firstly, the development of databases on non-violent conflicts and cooperation (to be used for regression analyses), especially at the intra-state level (Böhmelt et al. 2014; Day et al. 2014; Zeitoun/Mirumachi 2008) and, secondly, the development of more explicit theories about the occurrence of socio-environmental cooperation (which could in turn guide the choice of indicators in a GIS-based risk analysis) (Gemenne et al. 2014; Kelman 2012). Thirdly, the transition (or its failure) from socio-environmental conflicts to violence needs to be theorized and investigated in greater depth.

Finally, in the course of the spatial turn which has taken place in the social sciences since the 1980s, geographers as well as peace and conflict researchers have emphasized the *importance of space* in the analysis of violence, conflict and cooperation (e.g. Chojnacki/Engels 2013; Dunn 2001; Martin/Miller 2003; Massey 1984; Norman 2012). Recently, research on climate change and violent conflict has been challenged to engage more thoroughly with the various aspects of space (e.g. Detges 2014; Engels 2014; Engels/Chojnacki 2012; O'Loughlin et al. 2012; Rutten/Moses 2014), and especially with insights from spatial theory, in order to avoid getting caught in "the territorial trap" (Agnew 1994: 53). The role of space has so far not been discussed explicitly in this dissertation. However, it is a crosscutting and often implicitly addressed issue in the methodological and substantial discussions presented. Therefore, I will now examine the capability of the five methods under study to take into account recent insights regarding the relationship between space and (socio-environmental) conflict.

Spatial theory suggests that space is not just an external materiality in which social processes, including conflict and cooperation, take place. Rather, space should also be conceived as socially constructed in a twofold sense: Firstly, space as a material entity is produced by human actions, including the transformation of nature and the rise of capitalist or nationalist projects. And secondly, space is perceived by individuals in an inter-subjective manner structured by narratives or discourses (Chojnacki/Engels 2013; Dunn 2001; MacKinnon 2010; McMaster/Sheppard

2004). This holds true for the various dimensions of space, namely its vertical organization (scale), the concrete material and social relations which crystallize around certain locations (place), the laminar aspects of space (territory), and the lines which cut through and divide the horizontal dimension of space (borders) (Brenner 2008; Newman/Paasi 1998). Thus, spatial theory encourages scholars not to reduce space to a fixed physical reality, which structures conflict dynamics through, for example, the presence of resource assets (Le Billon 2001), of opportunities for spill-over dynamics (O'Loughlin et al. 2011), of rough terrain for rebels to hide (Fearon/Laitin 2003) or of international borders (Buhaug/Gates 2002), but to account for the dynamic interactions between spatial and social dynamics.

Discourse analysis is very well suited to analyze space as an inter-subjective social construct when studying the links between climate change and violent conflict. Narratives of resource abundant places, for instance, can motivate efforts to conquer these places (Dunn 2001; Rutten/Moses 2014), especially under conditions of resource scarcity. Negative othering of rival groups, if structured along the lines of borders and territories, produces "geographies of evil" (Campbell 2005: 88) and makes the violent escalation of conflicts over scarce renewable resources more likely (see chapter 4). The two discourses contrasted in chapter 6 also have important scalar dimensions, which influence patterns of socio-environmental conflict and cooperation. The GWN discourse constructs the watershed/ecosystem level as the adequate scale for water policy making, while the dominant Israeli and Palestinian discourses consider water to be an important aspect of nation state politics, and thus locate water policies on the national scale. The social construction of space in the sense of production of material entities, on the other hand, is beyond the scope of discourse analysis (MacKinnon 2010).

There are several case studies which investigate how the social construction of space as a material entity influences the dynamics of socio-environmental conflicts, especially within the capitalist political economy. Examples include conflicts related to frontier development (Simmons 2005), land grabbing (Fairhead et al. 2012), state building (Wittayapak 2008) and economic/world-market integration (Swyngedouw 2004; Watts 2004). However, in order to take the discursive construction of space into account, case studies have to overcome the positivist-rationalist bias, which characterizes many of them in the research on climate change and violent conflict, and adopt methodological insights from discourse analysis or narrative inquiry.

QCA can draw on both discourse analyses and case studies in order to compare the relevance of the social construction of space (as a material entity and an inter-subjective construct) over a medium number of cases. This has partly been shown in chapter 4, where negative othering and external resource appropriation were used as conditions in a QCA. However, QCA has difficulties generating data on the social construction of space by itself. In addition, pre-existing

case studies do not use a standardized terminology and put much emphasis on the ideographic features of specific spatial arrangements, thus making cross-case comparisons difficult (but not impossible). Quantitative methods still have enormous problems accounting for the historic generation/development of and the inter-subjective meanings attributed to particular spatial configurations. They conceptualize space "as being external to, and thus exerting influence upon, social conflictive action" (Chojnacki/Engels 2013: 5) without paying attention to the social construction of space, which is likely to be an important factor in most socio-environmental conflicts (Martin/Miller 2003). Regression analysis and GIS-based risk analysis can maybe use proxies to account for the social construction of space as a material entity, such as world market integration (Busby et al. 2012) as a proxy for the construction of capitalist scales or annual changes of forest cover as a proxy for the transformation of places and territories (Rustad et al. 2008). Nevertheless, both methods would still face enormous problems in escaping the territorial trap (Newman 2010).

Table 7 summarizes the strengths and weaknesses of the five research methods discussed in this dissertation with regard to the substantive findings of this dissertation and the social construction of space.

	regression analysis	**case study**	**GIS-based risk analysis**	**QCA**	**discourse analysis**
relevance of context factors	-	++	()	+	()
non-material factors	--	+	--	+	++
relationship conflict-violence	+	++	+	++	+
social construction of space	-	+	-	+	+

Table 7: Ability of different methods to take into consideration substantive findings of the research on climate change and violent conflict

++ very high ability; + high ability; () medium ability; - limited ability; -- low ability

7.2.3 Characteristics of the research field and methods

In his 2007 book, Gerring (2007: 37-63) discussed ten trade-offs between case studies and cross-case studies. While some of them are concerned with the characteristics of specific research designs in general, others relate to the state of the art in the research fields and the attributes of the subject under investigation. Five of those are especially relevant for methodological considerations in the research on climate change and violent conflict, namely those termed hypothesis, population, causal strength, data availability, and causal complexity by Gerring.

Hypothesis refers to the widely agreed point that qualitative methods are better in generating hypotheses, while quantitative methods have advantages in testing them (Mahoney 2010). This

distinction has been criticized as too simplistic, especially because qualitative case studies are not principally unsuitable to test hypothesis (Bartels 2004; Flyvbjerg 2006). Nevertheless, most scholars would accept that qualitative studies have a comparative advantage in generating hypotheses, while regression analysis has a comparative advantage in testing them (Gerring 2007: 39-43). There is also wide agreement that little is known about both the concrete causal pathways which might connect climate change to violent conflict and the relevant context factors (Buhaug et al. 2014; Hsiang et al. 2013; Koubi et al. 2012; Meierding 2013; Raleigh et al. 2014; Scheffran et al. 2012c). As a consequence, I would suggest that the generation of new hypotheses should be a major priority of the research on climate change and violent conflict. Regression analysis and GIS-based risk analysis are not able to fulfill this task because their major strength is testing or operationalizing existing hypotheses. The use of QCA to create hypotheses in an inductive manner is principally possible (Berg-Schlosser et al. 2009), but has been criticized as being not very reliable (Hug 2013). Discourse analysis can generate new hypotheses as long as they are concerned with the discursive realm, while case studies, especially if they refrain from a positivist epistemology and a rationalist-objectivist ontology, are highly eligible for hypothesis generation.

Regarding *population*, Gerring (2007: 50) states that when analyzing several cases, "they must be similar to each other in whatever respects might affect the causal relationship that the writer is investigating, or such differences must be controlled for." In other words, methods such as regression analysis or GIS-based risk analysis assume that the large number of cases they compare are different only in a minor number of dimensions relevant to the analysis (Brady et al. 2004). The findings from the case studies in chapter 3, however, contradict this assumption of unit homogeneity. Even in a single country like Kenya, there are many major and analytically highly relevant variations between the different regions. Many of those, such as precipitation perceptions, social networks, institutionalized structures of cooperation or violent cultures, are usually not accounted for in quantitative analysis (see also Adano et al. 2012; Campbell et al. 2009; Ember et al. 2012; Hendrickson et al. 1996; Ngaruiya 2014). Also within Israel and Palestine, chapter 6 has revealed considerable differences even at the very local level. This raises doubts about the findings of regression analyses or GIS-based risk analyses focusing on entire continents (e.g. Busby et al. 2013; Wischnath/Buhaug 2014) or even the whole world (e.g. Salehyan/Hendrix 2014; Slettebak 2012) while using a limited number of variables.

Given the high unit heterogeneity of the empirical subject of the research, qualitative small- to medium-N methods, which can account for local particularities, such as case study, QCA or discourse analysis, have advantages vis-à-vis regression analysis and GIS-based risk analysis in investigating a possible climate-conflict nexus. However, both QCA and discourse analysis also face limits in this regard. QCA has difficulty taking more than a handful of conditions into

account (and must select its cases in order to hold other relevant conditions constant, which is inherently difficult). Discourse analysis, even in its ontologically pragmatist version represented by SKAD, has problems considering (at least in a theoretically consistent manner) variations in material conditions.

The assumed *causal strength* between the independent and the dependent variable is also relevant when the suitability of various methods is discussed. Many quantitative and qualitative studies supporting a climate-conflict nexus emphasize that the strength of the link between climate change and violent conflict is rather low when compared with other drivers of violent conflict (e.g. de Châtel 2014; O'Loughlin et al. 2012; Raleigh/Urdal 2007; Schilling et al. 2012). Given the relevance of the context factors highlighted above, such a link is also likely to be probabilistic, i.e. likely to become manifest in a relevant part of but not in the whole population under study. And finally, the impact of some manifestations of climate change on violent conflict, such as higher temperatures, which are hypothesized to "cause increases in aggression" (Anderson 2001: 37), is very hard to observe or trace in concrete cases. All three factors - weak causal strength, probabilistic causality and unobservable causality - favor quantitative cross-case methods which can single out the average impacts of temperature changes for a large number of cases, for example (Gerring 2007: 53-55). This is particularly true for regression analysis (e.g. Buhaug/Theisen 2012; Hsiang et al. 2013; O'Loughlin et al. 2012). But temperature changes have also been included in the GIS-based risk analysis and were found to overlap quite well with the area in which the socio-environmental conflict between the SLDF and the Kenyan government took place (chapter 3.4.1).

Although the causal links between climate change and violent conflict are more observable and traceable for factors such as rainfall changes or natural disasters, case studies and discourse analyses still have problems accounting for weak and probabilistic causality. QCA enables researchers to include temperature or precipitation data for all cases under investigation and check for their cross-case effect. However, QCA has been developed to explain (almost) all cases under consideration and to include only variables and cases about which the research has a deeper qualitative knowledge (Ragin 1987; Schneider/Wagemann 2012), once again causing problems when dealing with weak/probabilistic causality.

Regarding quantitative *data availability*, Gerring (2007: 57f.) distinguishes between evidence-rich and evidence-poor environments:

> "An evidence-rich environment is one where all relevant factors are measurable, where these measurements are relatively precise, where they are rendered in comparable terms across cases, and where one can be relatively confident that the information is indeed accurate. An evidence-poor environment is the opposite"

Based on the extensive discussion of the issue in chapters 2-5, research on climate change and violent conflict has to be characterized as operating in an evidence-poor environment despite significant advantages in recent years (e.g. Chojnacki et al. 2012; Detges 2014; Hendrix/Salehyan 2012; Tollefsen et al. 2012). This is a major problem for quantitative methods such as regression analysis or GIS-based risk analysis, which have to rely on incomplete or unreliable quantitative data (see also Weidmann 2013). Data collection through field research represents a possibility to circumvent this problem (e.g. Ember et al. 2012), but reduces the results' external validity. QCA faces similar problems if it is conducted with quantitative datasets as, for example, Bretthauer (2014) has done. But QCAs can also rely on qualitative data in the form of case studies produced by field research (which are abundant in the literature), as has been shown in chapter 4. It is certainly not exaggerated to claim that this use of QCA is much more in line with the original intentions and aims of the method (Ragin 1987; Schneider/Wagemann 2012). Case study and discourse analysis are commonly acknowledged as well-suited for generating insights in evidence-poor environments through the collection and analysis of qualitative data (Bennet 2004; Gerring 2007: 58; Mahoney 2010).

The issue of *causal complexity* has been discussed at length in this dissertation. The potential causal links between climate change and violent conflict are very likely to be numerous, complex, dependent on a large number of (location-specific) context factors and sometimes weak and probabilistic. Different methods can account for different aspects of this complexity. Case studies, for instance, are especially sensitive to the particularity of their specific cases, but have problems detecting weak and probabilistic causal relationships. These can be captured by regression analyses very well, although this method has clear shortcomings when dealing with heterogeneous populations and conjunctural (rather than additive) relationships between variables. QCA has been developed to detect causal relationships characterized by conjunctural causation, equifinality and causal asymmetry, but can only include a very limited number of conditions in the analysis. GIS-based risk analysis has been used in chapter 3, but also by other scholars (e.g. Busby et al. 2014), to integrate a large number of quite different concepts and datasets, but is restricted by evidence-poor environments and has so far hardly ever been applied to generate or test causal arguments (but see Bocchi et al. 2006). Discourse analysis is best-suited to explore the influence of non-material factors such as identities and perceptions, which were found to be highly relevant for the research on climate change and violent conflict in chapters 5 and 6. But discourse analysis still has problems, or is characterized by inconsistencies, when material factors are taken into account. Therefore, one might paraphrase Gerring (2007: 62) in concluding that complexity, by itself (keeping in mind that complexity can mean many things), does not favor a specific method in the analysis of climate change and violent conflict.

Table 8 summarizes the strengths and weaknesses of the five research methods discussed with regard to the identified characteristics of the research field climate change and violent conflict.

	regression analysis	**case study**	**GIS-based risk analysis**	**QCA**	**discourse analysis**
hypothesis	--	++	--	-	+
population	-	++	-	+	+
causal strength	++	--	+	()	--
data availability	-	++	-	+	++
causal complexity	+	+	+	+	+

Table 8: Suitability of different methods regarding the characteristics of the research field climate change and violent conflict
++ very high suitability; + high suitability; () medium suitability; - limited suitability; -- low suitability

7.2.4 Summary

I will now summarize the findings of this thesis, with regard to the first central research question as outlined in the introduction:

Q1: Which research methods, besides the currently most-widely used (positivist-rationalist) case study and regression analysis, have the potential to increase our knowledge about the relationship between climate change and violent conflict? What are their strengths and weaknesses when applied to this research field and when compared to each other and to the so far most-widely used methods?

From chapters 3-6 and the above discussion, it can be concluded that GIS-based risk analysis, QCA and discourse analysis, if appropriately used, have a high potential to increase our knowledge on the possible links between climate change and violent conflict. However, the discussion on the last pages shows that the currently most-widely used methods in the research field, case study and regression analysis, also have their merits. There is no methodological silver bullet, no single method which is superior to all the others. Each of the five methods discussed has its specific advantages and shortcomings, in general and more specifically with regard to the research on climate change and violent conflict (Tables 6-8). Overly general judgements are also precluded because the methods can be used in different ways and embedded into different (good or bad) research designs. Case studies on the nexus between climate change and violent conflict, for instance, are often characterized by a positivist-rationalist bias (chapter 5), but a positivist epistemology and a rationalist-objectivist ontology are by no means defining characteristics of case study as a method. Another example is provided by researchers who collect local level data for regression analysis in order to circumvent the problems associated with using this method in an evidence-poor environment (Benjaminsen et al. 2012; Ravnborg et al. 2012; Schilling et al. 2014).

I have also identified different ways through which the various methods can complement each other. To name just a few: GIS-based risk analysis can support the selection of cases for case studies and QCAs, but also enables the ground checking of datasets used in regression analyses. Case studies can generate theories and hypotheses ("logic of discovery") which are then tested by regression analysis ("logic of confirmation") (Bennet 2004: 21). Conversely, case studies and QCAs can be used to uncover causal mechanisms indicated by the correlation coefficients of a regression analysis (Gerring 2007: 43-48). Discourse analysis challenges the positivist-rationalist bias which characterizes many case studies in the research on climate change and violent conflict, and provides valuable information/data to be used by QCAs. QCAs, in turn, can detect complex causal patterns, which can then either be tested for larger samples by regression analyses using interaction terms or be used in GIS-based risk analyses. Figure 15 provides an overview over the (possible) complementarities between the five methods as discussed in the course of this dissertation. A complete and nuanced discussion of every (possible) complementarity is beyond the scope of my study.

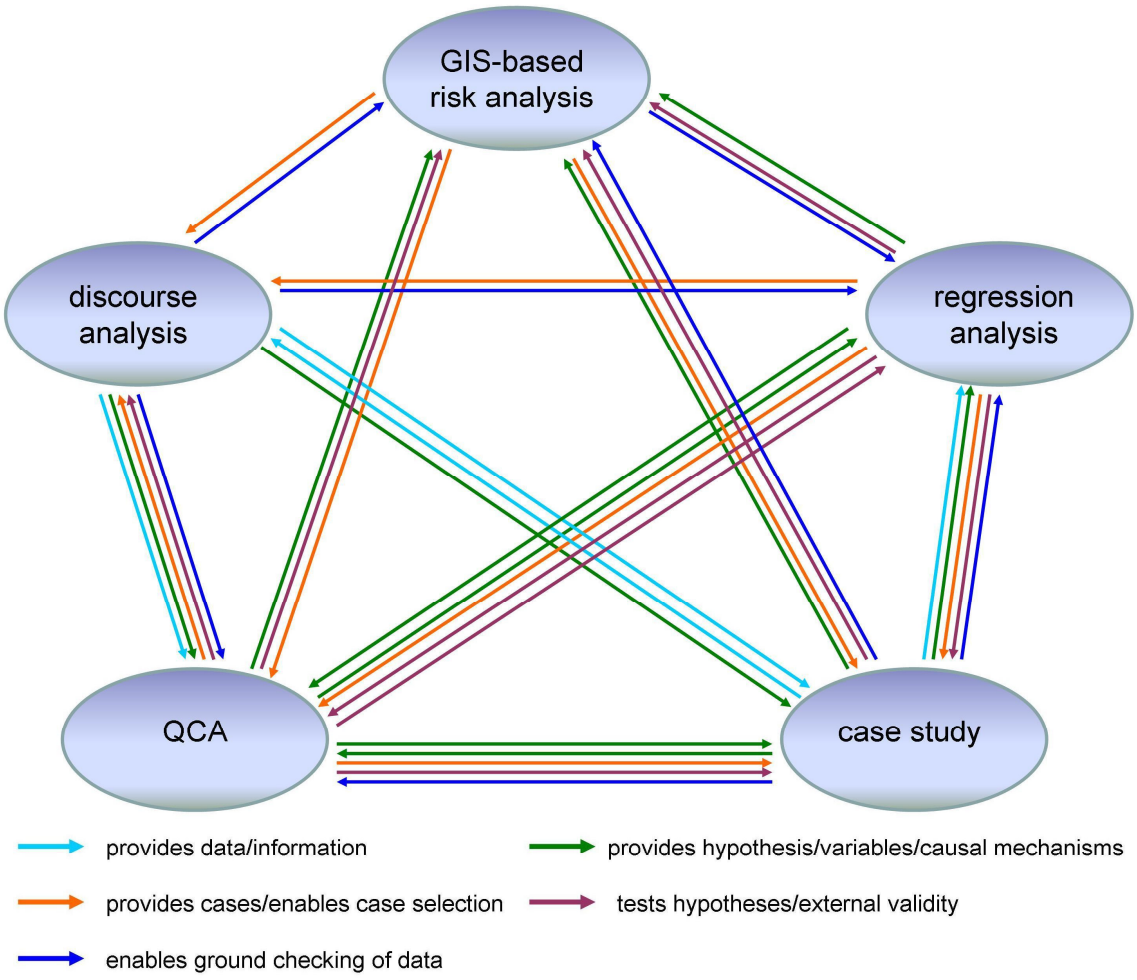

Figure 15: Potential complementarities between the different methods

Given the large number of complementarities, as well as the specific shortcomings of each method discussed above, mix-method research designs are strongly recommend for future investigations on climate change and violent conflict.

The choice of (a combination of) methods depends not least on the specific research questions a scholar would like to ask. If interested in the role of identities in connecting drought to conflict or cooperation, regressions analysis would not be the first methodological choice. If one would like to investigate the average impact of increased temperatures on civil war onset in Asia, an intensive single case study based on process tracing is obviously a suboptimal method. Regarding both - the fit between research question, design and method, and the complementarities between the various methods - Bennet (2004: 19) wrote: "Making the most of the synergies among research methods requires an understanding of the relative comparative advantages, trade-offs, and limitations of each method and an ability to translate between different methods". Hopefully, this dissertation has contributed to the generation of such understanding in the research field climate change and violet conflict.

Appendix I: Original data for the risk analysis (chapter 3)

Available online via: http://clisec.zmaw.de/index.php?id=2853

Appendix II: Risk analysis Kenya/Uganda 2008 (chapter 3)

Available online via: http://clisec.zmaw.de/index.php?id=2853

Appendix III: Risk analysis case studies (chapter 3)

Available online via: http://clisec.zmaw.de/index.php?id=2853

Appendix IV: Sample of cases and literature used for case descriptions (chapter 4)

Case	Time period	Literature used	Resources disputed
Chom Thong (Thailand)	1997-1998	(Bürgin 2000; Crooker 2006; Englehart 2008; Hares 2009; Lohmann 1999; Pinkaew 2000; Vandergeest 2003; Wittayapak 2008; Yamaguchi 2007; York 2002)	water, land, forest
Condega (Nicaragua)	2000-2007	(Gomez/Ravnborg 2011; Mena et al. 2010a, 2010b, 2010c)	water
Dir Kohistan (Pakistan)	1993-2000	(Gillet 2001; Khan 2003, 2008; Khan et al. 2006a; Khan et al. 2006b; Matthew/Hammill 2007)	land, forest
Ferghana Valley (Kyrgyzstan/Tajikistan/ Uzbekistan)	2001-2005	(Bichsel 2009a, 2009b; de Martino et al. 2005; Giese/Sehring 2006; O'Hara 2000; Sehring/Giese 2011; Wegerich et al. 2012)	water, land
Galapágos (Ecuador)	1992-1999	(Allegretti et al. 2012; Bremner/Perez 2002; Celata/Sanna 2012; Epler 2007; Heylings/Cruz 1998; Macdonald 1997; Oviedo 1999; Quiroga 2009; Schrope 2000; Zapata Erazo 2005)	fish
Guadalcanal (Solomon Islands)	1998-2003	(Allen 2012; Bennet 2002; Blondel 2012; Connell 2006; Moore 2004; Ponzio 2005; UNDP 2004)	land
Guerdane (Marokko)	1996-2007	(Houdret 2010; Houdret/Bonnet 2013; Houdret 2012; Popp 1983; Turner 1999)	water
Jabal Sabr (Yemen)	1997-2001	(AbuZaid/Abdel-Meguid 2006; Al-Shaybani/al-Zubayri 2005; Gatter 2012; Hales 2010; Lichenthäler/Turton 1999; Ward 2009; Zeitoun 2009)	water
Kalimantan (Indonesien)	1998-2003	(Barber 1998; Hakim et al. 2005; Jarvie et al. 2003; McCarthy 2004; Palmer/Engel 2007; Resosudarmo 2004; Schröder-Wildberg/Carius 2003; Yasmi 2003; Yasmi et al. 2006)	land, forest
Kilosa (Tanzania)	2000-2008	(Baha et al. 2008; Benjaminsen et al. 2009; Maganga et al. 2007; Malley et al. 2008; Oodgard 2006)	water, land
Koshi Tappu (Nepal)	1992-2001	(Heinen 1993; Karki et al. 2006; Lam 2004; Limbu/Karki 2003; Matthew/Upreti 2005; Shrestha/Alavalapati 2006)	land, forest. fish
Masina (Mali)	1991-2001	(Benjaminsen/Ba 2009; Benjaminsen et al. 2012; Cotula/Cissé 2006; Schilling et al. 2010; Turner 2006)	Land
Mbeza (Zambia)	2002-2003	(Brown 2005; Funder/Mweemba 2010; Funder et al. 2010; Haller 2013)	water, land
Merka (India)	1995-2002	(Cullet et al. 2012; Mehta 1997, 2005, 2011)	water
Northeastern Nigeria	2000-2005	(Abbass 2012; Azuwike/Enverem 2010; Fasona/Omojola 2005; Nyong 2007; Nyong et al. 2006; Obioha 2008; Onuoha 2010; Williams et al. 1999)	water, land
Southern Oromya	1995-2007	(Abdulahi 2005; Hagmann/Mulugeta 2008; Kamara et al. 2004; Stark et al. 2011; Temesgen 2010)	water, land
Southern Pará (Brazil)	1990-1996	(Alston et al. 2000; Branford/Rocha 2002; de Almeida/Sánchez 2000; Fearnside 2001; Hammond 2009; Simmons 2004, 2005; Simmons et al. 2007; Timura 2001)	land

Tiraque (Bolivia)	2000-2004	(Cossio et al. 2010a, 2010b; Funder et al. 2012)	water
Tonle Sap (Cambodia)	1993-2001	(Bonheur/Lane 2002; Degen et al. 2000; Keskinen et al. 2007; Nuorteva et al. 2010; Salayo et al. 2006; Seng et al. 2005)	water, land, fish
Turkana (Kenia)	2003-2009	(Eaton 2008; Ember et al. 2012; Eriksen/Lind 2006; Hendrickson et al. 1996; Njiru 2012; Omolo 2010; Schilling et al. 2012; Schilling et al. 2014)	water, land

Appendix V: Case descriptions and calibration decisions (chapter 4)

Place: Chom Thong (Thailand)
Time: 1997-1998

Short description of the case
Chom Thong is a rural district in mountainous north-western Thailand. The valleys in the area were characterized by paddy rice fields, longan plantations and vegetable fields, mostly owned by ethnic Thai. Closer to the mountain peaks, ethnic minorities like the Hmong and Karen were the majority. Some of them still practiced traditional swidden agriculture, but most have shifted to the sedentary cultivation of cash crops during the 1980s. Deforestation, soil erosion, reduced water availability and population growth interacted with socio-economic factors to induce several, overlapping conflicts between lowlanders and highland communities in the 1990s. First, lowland farmers accused highland minorities to destroy watershed forests and to use too much water and agrochemicals for cash crop cultivation, which was conceived as the major cause of water scarcity and pollution in the valleys. Highland groups, by contrast, attributed these problems to deforestation and the commercialization of agriculture in the lowlands. Second, the Royal Forestry Division (RFD) had declared most hill areas of Chom Thong as protected forests, important watersheds and/or national parks. Efforts were undertaken to relocate minority communities from the protected areas or deny them access to the forests, which was resisted by Hmong and Karen. Third, a conservationist alliance led by the Dhammanaat Foundation also demanded the removal of ethnic minorities from the ecologically important watershed forests. After a severe drought, an economic crisis and a pro-highlander cabinet resolution in 1997/1998, tensions escalated, leading to the destruction of pavilions and religious symbols by conservationists and national park officials, various acts of sabotage and destruction against highland communities, and a three month blockade of roads leading to the highlands by lowland farmers. Eventually, the large majority of highland communities were not resettled.

Violence: 0
No physical violence against humans was employed in the course of the conflict.

External resource appropriation: 0.67
Water is a public resource in the area, but just as land, it is partially utilized by highland and lowland communities as well as a few agribusiness companies to produce cash crops for external markets. Basically all highland forests were declared protected, while lowland forests had virtually disappeared due to past logging and timer exports. The National Watershed Policy of 1985 limited agricultural expansion in the highlands.

Power differences: 1
The various lowland groups were significantly more powerful than the highland ethnic minorities. They could draw on the material, technical and financial resources of the RFD, National Park authorities, and the Dhammanaat Foundation, as well as on support by the military. Their relational power was increased by their status as ethnic Thais and the connectivity of their conservation discourses to national and international audiences. A large percentage of the Hmong and Karen, by contrast, were not formally recognized as Thai citizens in 1998.

Recent political change: 0.67
Thailand experienced democratization in 1992. The highland forests of Chom Thong were declared as protected forests in 1989, and watershed forests as well as national parks had been demarcated even earlier. While these changes took place some time ago, a 1997 cabinet resolution

allowed highlanders to stay on contested land under certain conditions, which led to protests by lowland farmers and the Dhammanaat Foundation.

Negative othering: 0.33
The integration of minorities into the Thai state happened rather smooth during the 20th century and before. Tensions occurred in the course of the government's attempts to fight communist insurgents in the 1970s, opium cultivation in the 1980s, and deforestation in the 1990s. But the various conflict parties did not conceive each other as an existential threat. Historical relations between highland minorities and lowland Thais were considered as good and complementary until the 1960s. However, the Hmong and Karen are clearly perceived as undeveloped, unaware of environmental problems and foreign by the Thai lowlanders and the RFD. No comparable perceptions of inferiority and superiority existed on the side of the Hmong and Karen.

Place: Condega
Time: 2000-2007

Short description of the case
Condega is a largely rural municipality in northern Nicaragua. The climate can be characterized as semi-arid, although there exist local variations. The large majority of the population was poor and engaged in subsistence agriculture, while some larger farmers produced crops for (primarily local) markets. Most non-poor households owned some cattle. During the dry season, labor migration to Costa Rica was frequent. Condega was hit by Hurricane Mitch in 1998, causing damage to the water infrastructure and even burying some springs. The appearance of several unusually severe droughts during the 2000s as well as high population growth aggravated the situation. Simultaneously, the more wealthy households expanded irrigated agriculture in order to produce cash crops (potatoes, tomatoes, coffee, tobacco) for local markets and brokers. At several instances, water for irrigation was illegally taken from public rivers or drinking water networks/tanks. Occasionally, wealthy households also used drinking water to water their cattle, which was illegal too. The poorer members of the communities opposed the illegal appropriation of public water resources since they consequently suffered from an increasing scarcity of water for drinking, washing, cleaning, and sometimes irrigation. But these poorer households were unable to confront the wealthy irrigators directly due to the latter's enormous influence as community leaders, water committee members, and/or employers of day laborers. As a consequence, disadvantaged households either complained via third parties such as other wealthy households (which sometimes led to a resolution of the dispute), or the conflict remained unresolved.

Violence: 0
No physical violence was employed in water conflicts in Condega. The parties either issued verbal complains, negotiated with each other and with third parties, or undertook no actions at all.

External resource appropriation: 0
Most land and water in Condega was used for subsistence production. Even the wealthier large-scale farmers produced mostly for subsistence and local markets.

Power differences: 1
The wealthy households which appropriated public water resources for irrigation and cattle watering were much more influential in terms of hard and relations power. They had more money at their disposal, provided day laborer jobs and credits to the local population, served as community leaders and members of the local water committees, and/or had connections to regional authorities/politicians.

Recent political change: 0
Nicaragua's democratization happened ten years before the study period and a new water law was not passed until 2007.

Negative othering: 0
Parts of Condega suffered from the civil war in the 1980s, but there was no fighting between different segments of the local population. The ethnic heterogeneity of the region was low and historical cleavages between the different groups were virtually absent. No perceptions of inferiority or existential threat prevailed.

Place: Dir Kohistan
Time: 1993-2000

Short description of the case
Dir Kohistan is a valley in the North West Frontier Province of Pakistan. The valley belongs to one of the poorest areas in Pakistan and was politically unstable for decades. Subsistence agriculture was the main source of livelihood for the local population, but was complemented by harvesting forest products and timber royalties. Local communities had the right to receive the latter as their share of the income derived from timber sales. Most of the timber logged in Dir Kohistan was harvested by forest contractors and sold on external markets. Pressure on the existing forest resources was increasing since the 1970s. On the one hand, local communities had to convert forest into agricultural land because existing fields and pastures became insufficient due to population growth and soil degradation. On the other hand, forest contractors were exploiting the forests in Dir Kohistan more rapidly, often in collusion with forest officials and some local elders who were paid to ignore illegal logging and to minimize the amount of royalties received by locals. The rapid deforestation and the declaration of basically all forests in the area as protected in 1975 (which restricted subsistence access to forest resources) further undermined the livelihoods of the local population. After the region was hit by devastating floods in 1992, the government declared a logging ban for Dir Kohistan in 1993 in order to allow regeneration of the forests. But forest contractors found ways to avoid the ban, thereby escalating tensions about the non-payment of timber royalties and about the encroachment of former community forests. Youths formed the Kalkot Youth Welfare Society (KYWS) and established a checkpoint on which they prevented the movement of timer out of Dir Kohistan. This was resisted by the forest contractors and forest officials, but supported by other local inhabitants who staged supporting protests. After some clashes and a long-standing legal procedure between both parties, the dispute was finally settled by an assembly of local elders (*jirga*) in favor of the KYWS in 2000.

Violence: 0.33
There were various physical clashes around the KYWS checkpoint during which one timber smuggler was shot dead. But none of the conflict parties used violence frequently or in a systematic manner.

External resource appropriation: 1
A significant part of the forest resources in Dir Kohistan was utilized by forest contractors. Nearly all forests in the region were also declared as protected by forest authorities, which limited the rights and possibilities of local inhabitants to utilize resources from these forests. The situation was aggravated by the logging ban declared in 1993.

Power differences: 0.67
The ability of the Pakistani state to control Dir Kohistan was limited, but officials from the forestry department and the forest contractors still commanded more hard power (violence capabilities, money) than the poor local inhabitants. In terms of soft power, the legitimacy of the KYWS in the local context was balanced by the links between forest officials/forest contractors and national elites as well as international actors.

Recent political change: 0.67
In 1988, democracy was restored in Pakistan. More important were court rulings in 1990 and 1994, which declared the Provincially Administrated Tribal Area Regulations under which Dir Kohistan was governed as unconstitutional, leading to the introduction of a quasi-Islamic local government system in 1994. The last major change of the forest regime occurred in 1971 when Dir Kohistan's forests were declared as state property.

Negative othering: 0.67
All parties involved in the conflict conceived the other groups neither as an existential threat nor as inferior to the self. However, forest official perceived the KYWS as a threat to the authority of the state and forest conservation aims, while the forest contractors understood them as a risk for their business interests. The population of Dir Kohistan was very distrustful vis-à-vis the forest contractors, which had betrayed them for years, and state authorities, because the military had violently intervened in the area several times since the 1970s.

Place: Ferghana Valley (Kyrgyzstan/Tajikistan/Uzbekistan)
Time: 2001-2005

Short description of the case
Ferghana is a populous valley that is shared between the states of Kyrgyzstan, Tajikistan and Uzbekistan. In order to sustain its livelihood, the majority of the multi-ethnic population was active in agriculture, which strongly depended on irrigation due to the arid climate. Water for irrigation was taken from the Syr Daria and various smaller rivers and springs. Large parts of the irrigation systems were in a very bad condition and shared between two or more countries after the dissolution of the Soviet Union in 1991. This aggravated existing environmental problems such as water and land scarcity, soil salinization and degradation, deforestation, and water/soil pollution from agrochemicals. The Ferghana valley was also characterized by various socio-political problems, such as corrupt and weak governance, population growth, ethnic heterogeneity and ethnic tensions, contested borders, the presence of armed Islamists and criminals, a low level of human development and inequality. In the early 2000s, various disputes around land and water resources as well as irrigation schemes overlapped with ethnic or residential grievances and political instrumentalization to produce land and water conflicts between local communities. Examples include the conflicts between the Kyrgyzstani villages Alga, Khalmoin and Pülgön, between the Khush'iar village in Uzebekistan and communities from Sogment and Charbak in Kyrgyzstan, between Chorku (Tajikistan) and Kök-Tash (Kyrgyzstan), and conflict in the Ala Burka district of Kyrgyzstan.

Violence: 0.33
In several water conflicts, one or more groups used direct, physical violence, primarily by beating their opponents, leading to fatalities in very rare cases. But none of these conflicts escalated to the level of sustained, systematic violence. Verbal disputes, negotiations, and resorting to formal and traditional authorities were the major actions conducted by the conflict parties.

External resource appropriation: 0.67
Cotton produced for the world market was the dominant crop in the Ferghana valley until 1991. Afterwards, the governments of the newly independent states encouraged the growth of wheat in order to ensure nation food security. However, large tracks of land and considerable amounts of water are still used to produce cotton and other cash crops for export.

Power differences: 0
Geographical variations in the power relations existed between the various parties quarreling about land and water. These power relations were shaped by upstream-downstream relations, the ethnic composition of the population, and the existence of benign/hostile authorities nearby, among others. But in general, no significant differences regarding hard or soft power could be detected.

Recent political change: 0.33
The independence of Kyrgyzstan, Tajikistan and Uzbekistan was of course a major political change, but it occurred a decade before 2001. Increasing efforts by all three states to tighten border controls in the late 1990s accelerated problems regarding the use and maintenance of transnational water infrastructure and complicated cross-border cooperation.

Negative othering: 0.33
There was a history of ethnic conflict and water/land disputes in the valley. But in many cases the frontiers in water and land conflicts did not overlap with ethnic cleavages. The various local groups in conflict did neither perceive each other as inferior nor as an existential threat, although a considerable amount of mistrust existed.

Place: Galapágos (Ecuador)
Time: 1992-1999

Short description of the case
The Galapágos Islands are located approximately 1,000 km west of the coast of mainland Ecuador. They were famous for the enormous biodiversity and for being the place where Charles Darwin formulated his theory of evolution. More than 97% of the area of the islands were declared as a national park in 1959 and were administered by the Charles Darwin Foundation (CDF) and the Galapagos National Park Service (GNPS). While these restrictions and external interventions were largely unproblematic until the early 1980s, things changed with a fast growing tourism industry, high levels of population growth (around 6% between 1982 and 1998) due to high birth rates and especially immigration, the introduction of industrial fishing, and the appearance of international seafood brokers. The use of land, forests and maritime resources was further restricted with the declaration of the ocean around Galápagos as a marine reserve in 1986. The tourism and the public sector were the largest employers on the islands, but small-scale fishing employed at least 13% of the population (and up to 30% of the population on some islands). In 1992, after being lobbied by the CDF and other conservation organizations, the government of Ecuador declared a ban of fishing sea cucumber which was profitably be exported to Asian markets. Local fishers formed cooperatives and protested against the ban (which was preceded by restrictions on lobster, shark and turtle fishing) as well as their exclusion from the related consultation and decision-making process. After the ban was partially lifted in 1994, the national park administrations and the CDF were again able to establish a sea cucumber fishery ban in 1995. Consequentially, local fisherman staged protests and riots against this decision. Tensions eased with the passage of the 1998 Special Law for Galapágos (excluding industrial fishing enterprises from the area) and the partial lifting of the cucumber fishing ban in 1999.

Violence: 0
All parties involved in the conflict did not resort to use of violence against members of the other group. Galapágos fishermen murdered some turtles, threatened CDF staff and destroyed property, while national park authorities confiscated illegally fished sea cucumber, exacted fines and arrested violators of fishing regulations.

External resource appropriation: 1
Around 97.5 percent of the Galapágos area as well as the surrounding waters were declared as a national park. Access to and use of these areas by local was seriously restricted. Industrial fishing enterprises caught for the mainland and export markets, while sea cucumber was also mainly caught for export.

Power differences: 1
The CDF and the GNPS were well-connected to international organizations and media, had a significant amount of money at their disposal, and also largely enjoyed the support of the Ecuadorian government. Local fishers were relatively poor, had no support from international actors, and were constantly in dispute with industrial fishing enterprises (that opposed fishing bans as well).

Recent political change: 0.67
The political system of Ecuador experienced no fundamental change prior to 1992. However, the sea cucumber fishery ban of 1992 (together with the demarcation of the Galápagos Marine Reserve in 1986 and the approval of its management plan in 1992) was a major change of the local fishery regime.

Negative othering: 0.33
Conservation agencies perceived the local fishers as a threat to a unique ecosystem, indicating a perception of local fishers as unable to conserve their environment. But such conceptions of inferiority were only shared by a minority of the conflict parties. Local fishers perceived fishing regulations as a threat to their living standard, but agreed on the necessity of such regulations (although not on the way these were negotiated and designed). Latent conflicts between fishery and conservationist interests were existing in the region since 1959.

Place: Guadalcanal (Solomon Islands)
Time: 1998-2003

Short description of the case
Guadalcanal is an island belonging to the Solomon Islands. It was the economic centre of the Solomon Islands because it hosted the capital city (Honiara) and the major airport of the archipelago state. Timber logging, coconut and palm oil plantations, and the Gold Ridge mine were also crucial for Guadalcanal's economy in the 1990s. The relative economic strength of Guadalcanal attracted migrants from the other islands of the Solomons, particularly from Malaita, from the 1950s onwards and especially in the 1990s. Since the early 1990s, tensions arose between the native Guales and the immigrant Malaitans (many of them living at the island since two or three generations) about land for construction and agricultural purposes. These tensions were fuelled by different traditional understandings of land inheritance and land ownership between Malaitans and Guales, but also by soil degradation and land scarcity caused by population growth and the occupation of land by mining, plantation and logging schemes. Disputes between Malaitans and Guales interacted with poor governance, widespread poverty and unemployment, an economic crisis, government budget cuts and various pre-existing ethnic, social and territorial grievances. As a consequence, the Guales formed the Isatabu Freedom Movement (IFM) in 1998 to harass Malaitans and expulse them from Guadalcanal. The Malaitans responded with the foundation of the Malaita Eagle Force (MEF) and a low-intensity civil war erupted between both paramilitary groups. After various peace negotiations and a coup d'état in 2000, the conflict ended with the arrival of the Australian-led Regional Assistance Mission to Solomon Islands (RAMSI) in 2003.

Violence: 1
Direct, physical violence, including the use of small semi-automatic weapons, was utilized in a systematic manner by both the IFM and the MEF. Several dozens of fatalities were reported.

External resource appropriation: 0.67
More than 75% of Guadalcanal's population relied on subsistence agriculture practiced on customary land during the study period. However, coconut, cocoa and oil palm plantations, logging, and gold mining accounted for nearly all exports of Guadalcanal and occupied vast tracks of land. Some customary land had been sold by self-declared chiefs to commercial enterprises (or Malaitans) without the agreement of the local community and without adequate benefit sharing.

Power differences: 0
No conflict party received important outside support or had any connections indicating an advantage in relational power. The amount of hard power between both groups was also roughly equal, since the demographic advantage of the Guale IFM was balanced by the Malaitan dominance of the police forces.

Recent political change: 0
No major change of the political system or land policies took place after the Solomon Islands became independent in 1978.

Negative othering: 0.67
Guales and Malaitans did not conceive each other as an existential threat to the in-group prior to the onset of the violent clashes in 1998. But both the foundation of the IFM and the emergence of the MEF were facilitated by perceptions of superiority of the own and inferiority of the other group. Guales accused the Malaitans of being disrespectful, violent and greedy outsiders, which had no right to own land on Guadalcanal. Malaitans, by contrast, conceptualized themselves as

hard working, good citizens and even 'nation builders', while the Guales neither respect (land-related) laws nor the authority of the nation state.

Place: Guerdane (Morocco)
Time: 1996-2007

Short description of the case
Guerdane is an area in the central Souss valley in southern Morocco. The Souss valley was one of the most important economic centers of the country because citrus fruits were cultivated there for lucrative export. Beside these large-scale farming enterprises, small farmers cultivated vegetables for subsistence and citrus fruits for local markets. Due to the arid climate, both small- and large-scale farmers heavily depended on irrigation systems fed by a large underground water aquifer. However, this aquifer had been over-pumped since the 1950s with the water level falling by 0.5-2.5 meters per year since the 1970s. The problem is aggravated by more frequent droughts in the previous two decades. Because of the sinking water tables, many wells dried out, forcing most farmers to abandon parts of their fields or agriculture altogether. Only few large-scale, export-oriented farmers could afford to deepen existing or drill new wells in order to hold their water supply constant. The resulting scarcity of groundwater (and land under which the aquifer is relatively shallow) caused disputes over irrigation water especially between large- and small-scale farmers. Less frequent were conflicts about the use of water for irrigation or drinking purposes and between different drinking water users. Local authorities were highly biased in favor of rich large-scale farmers and frequently not even sanctioned clearly illegal appropriation of groundwater resources.

Violence: 0
Besides some destruction of human property, several verbal or symbolic acts of threat, and the imprisonment of protesters, no uses of violence during the water conflicts in Guerdane are documented in the literature.

External resource appropriation: 1
The water level of the local aquifer was falling rapidly due to the large-scale cultivation of citrus fruits for export markets (74% of all citrus fruits exported by Morocco were produced in the Souss valley). Parts of the aquifer water were also utilized for tourism around Agadir. Similarly, large tracks of the most productive land were utilized by large export-oriented farmers. This process accelerated since the 1990s because development schemes oriented towards commercial farming (e.g. the El Guerdane irrigation project or the Mokhtar Soussi dam) and because many small farmers had to sell their land since they could no longer sustain their livelihood without sufficient irrigation.

Power differences: 1
The large-scale, export-oriented farmers had significantly more money at their disposal and were either part of or well connected to the ruling elites in the Morocco. They were therefore strongly supported by local and national authorities.

Recent political change: 0
Morocco experienced a slight political liberalization during the 1990s, but no fundamental characteristics of the political systems were changed. Similarly, the last important change in resource-related policies occurred during the Structural Adjustment Program in the 1980s.

Negative othering: 0
The region was historically largely free of conflicts and the ethnic divide between Arabs and Berbers played no role in water-related tensions. There were no perceptions of inferiority and especially small farmers sometimes conceived the changes threatening their livelihoods as caused by nature or God.

Place: Jabal Sabr
Time: 1997-2001

Short description of the case
On the Jabal Sabr mountain in southwestern Yemen, close to the city of Ta'iz, a water conflict between two villages escalated in the late 1990s. The region was arid and heavily dependent on agriculture, which employs 75% of the rural workforce. Agriculture was only possible in the area because groundwater was utilized for irrigation, but water levels were rapidly sinking since approximately 1975 due to aquifer overpumping. The population was growing by more than three percent per year. In 1997, the village of Quradah received financial support from the government in order to improve a tank and a pipe system connecting a local spring to their village. But Al Marzooh, a nearby village, protested against the planed rehabilitation. One of the springs providing water for Al Marzooh was located just 50 meters below Quradah's water tank. Its inhabitants feared that the amount of water originating from this spring would be reduced as a consequence of the improvement of Quradah's water supply and distribution system. Traditional mediation failed and people from Al Marzooh eventually destroyed pipes and construction equipment several times. This resulted in heated disputes, sabotage acts, fights and even gun battles between both villages. After several mediation efforts, the conflict was finally resolved by a court decision in 2001.

Violence: 1
Deadly violence was used frequently by people from both villages. Gun ownership was widespread. Soldiers were sent to the area by the governor in order to calm down the situation, but they were unable to prevent another gun battle leaving five villagers dead and twenty villagers injured.

External resource appropriation: 0.33
Several conflicts in the region have escalated into open violence during the 1990s because groundwater resources have been appropriated for urban dwellers and industries in Ta'iz, leading to sinking groundwater levels and water scarcity in the surrounding villages. However, no such 'water grabbing' occurred in close proximity to Quradah or Al Marzooh. Some large-scale, export-oriented farmers use vast amounts of groundwater around Ta'iz.

Power differences: 0
No significant differences of hard or soft power between both villages could be detected.

Recent political change: 0.67
Yemen experienced considerable political changes in the 1990s, including the unification in 1990, a civil war in 1994, the implementation of a Structural Adjustment Program in 1995 and various changes of the constitution. By contrast, no major changes of the water regime occurred prior to 1997 (a Water Law was not passed before 2002 and the Ministry of Water and Environment was established in 2003).

Negative othering: 0.67
After years of political turmoil, the level of mistrust and perceived insecurity was high in Yemen. Quradah and Al Marzooh had disputes about several issues, including water, prior to the study period. Both villages thus considered efforts of the other to develop (or prevent the development of) water infrastructure as a potentially severe threat.

Place: Kalimantan (Indonesia)
Time: 1998-2003

Short description of the case
Kalimantan is an island belonging to Indonesia. Large parts of it were covered by dense tropical forest until the late 1960s, when the Suharto regime decided to utilize the country's forest resources for timer exports and the paper/pulp industry. This caused intense grievances among the local population, which often depended on forest resources for food, rattan, medical plants, wood and agricultural expansion. Protests against Suharto's forest policies were rigidly repressed. In 1998, the Suharto regime collapsed and gave way for democratization and decentralization. This encouraged local communities in Kalimantan to insist on their customary rights (*adat*) to the forest areas and/or to demand a greater share of the revenues derived from logging operations. Simultaneously, demands on the local forest resources grew because in the course of decentralization, district governments where allowed to issue small-scale logging permits (which often overlapped with the large-scale permits issued by the ministry of forestry and/or communal lands). The situation was aggravated by rural population growth, the Asian economic crisis in 1997, the weakness of the new government, widespread corruption/patronage in forest politics, and various environmental problems related to deforestation (e.g. soil degradation, floods, sedimentation of rivers). As a consequence, open conflicts between timber concessionaires/companies and local communities occurred all over Kalimantan from 1998 onwards. In March 2003, the rights of district governments to issue logging permits expired.

Violence: 0.33
There were some incidents of physical violence between members of local communities and the workers or security guards hired by timber concessionaires. However, the primary means to carry out disputes around forests and the related land resources were verbal disputes, negotiations, and the occasionally destruction of working equipment or the burning of working camps by local communities.

External resource appropriation: 0.67
Large parts of Kalimantan's forests were either already logged in order to supply timber for international markets and the paper/pulp industry, or owned by concessionaires seeking the commercial exploitation of the forests. Additional pressure on the land and forest resources was caused by the development of large mining schemes and plantations. Forests located on village lands formally belonged to the community, although this was not always respected. After democratization, the customary land rights of local communities were strengthened, but still far from secure.

Power differences: 0
Most timber concessions in Kalimantan were hold by small- and medium-size companies, which often lacked good connections to all of the many relevant state agencies (most of which were weakened after the 1998 political changes and the 1997 economic crisis anyway). Hiring a significant number private security guards or paying high bribes to the local police/military was often either economically irrational or not even possible for smaller companies operating in remote areas. The differences regarding hard and relational power between timber concessionaires and local communities were thus rather low.

Recent political change: 1
Indonesia experienced democratization in 1998. Simultaneously, district governments received rights to issue small-scale logging permits, thus accelerating pressure on Kalimantan's forest resources and conflicts between various stakeholders (local communities, local political entrepreneurs, owners of small-scale logging permits, and owners of large-scale permits).

Negative othering: 0.33
There were some ethnic tensions involved in the forest conflicts in Kalimantan, especially between the native Dayak population and the ethnic groups, which had migrated to Kalimantan as forest concessionaires or timber workers (e.g. Madurese or Bugis). Historical cleavages between the local communities and the timber companies (supported by the state) were more salient, however. But altogether, only a minority of the persons involved conceived other groups as inferior or an existential threat (although perceptions of undermining each other's livelihoods were widespread).

Place: Kilosa (Tanzania)
Time: 2000-2008

Short description of the case
Kilosa is a district in the Morogoro region of Tanzania. Despite its largely semi-arid climate, the area was suited for agriculture and pastoralism due to the existence of perennial rivers. But population growth (caused by high fertility rates and immigration) and more frequent droughts had put the agricultural capacity of the region under severe stress. Consequentially, farmers expanded their cultivation area towards the riverbeds where soil fertility and moisture were higher and they had the opportunity to use irrigation techniques. This was resisted by pastoralist groups, which considered the floodplains as their traditional dry season pasture. Similar conflicts occurred in areas where farmers expanded their fields into transhumance movement corridors or where cattle herds invaded the fields of farmers. These conflicts were aggravated by poor (national and local) governance, a historical discrimination of pastoralists and pre-existing cleavages between farmers and pastoralists, which often overlapped with differences between ethnic groups (e.g. Barabaig and Kaguru as farmers, Parakuyo Maasai and Sagara as pastoralists). The 1999 Land Acts stimulated efforts to delineate borders and formalize land rights and thus also contributed to the escalation of local tensions.

Violence: 0.33
There were two incidences of violence in the conflict over water and land, which caused approximately 30 fatalities around Mabwegere village in 2000 and at least eight fatalities around Rudewa Mbuyuni village in 2008. All other disputes over water and land were carried out by non-violent means.

External resource appropriation: 0.67
A significant amount of land (and the water located on and under this land) was in the hand of external actors. Around one third of Kilosa was covered by conservation schemes and the Land Amendment Act of 2004 facilitated the already ongoing process of selling land to urban elites. There are some large sisal and sugar cane estates as well as a few large cattle ranches in Kilosa.

Power differences: 0.33
The power differences between the various groups living in Kilosa were generally low. Agricultural groups were the majority in many parts of the district, which increased their hard power due to stronger physical presence and their soft power due to better political representation. Pastoralist groups, by contrast, are said to be more successful in administrative and legal proceedings, either because they are more wealthy and can bribe the relevant authorities or because they are more familiar with the existing laws and procedures.

Recent political change: 0.67
Tanzania experienced a partial transformation from a one-party autocracy to a multiparty democracy in 1995. However, its political system was not considered to be fully democratic in the 2000-2008 period as several autocratic elements persisted. The transition of 1995 also had only few impacts on the social interactions in Kilosa from 2000 onwards. But the Investment Act in 1997, the Village Act and the Land Act in 1999, as well as the Land Amendment Act in 2004 strongly changed the legal land regime. These laws inter alia transferred decision making power regarding land allocation to the village councils, facilitated the demarcation of land and the development of land management plans, allowed the possession of land by non-citizens, and permitted the sale and mortgaging of bare land.

Negative othering: 0.33
Farmers and pastoralists did not conceive each other as an existential threat to each other. Many farmers conceived the pastoralists as *wageni* (non-natives) whose claims to land and water resources are secondary to those of the *wenyeji* (natives), especially since pastoralists are unable to manage their lands in an ecologically sustainable way. This contributed to ethnic tensions in Kilosa, but neither the ethnic cleavages between pastoralists and farmers nor the *wageni-wenyeji* dichotomy were clear cut or accepted by all actors.

Place: Koshi Tappu (Nepal)
Time: 1992-2001

Short description of the case
Koshi Tappu is a wetland area around the Koshi River in southeastern Nepal. It was predominately rural, but had a relatively high population density of approximately 620 persons/km^2. Koshi Tapu was part of the *terai* lowlands with a subtropical climate and a high potential for agriculture. The population depended strongly on agriculture as well as wetland resources to sustain their livelihoods. The inhabitants of the region were rather poor, also because land was unequally distributed. Between 1958 and 1964, India constructed a dam and embankments on the Koshi River in order to irrigate fields in northeastern India. This was approved by the Nepali government, which also leased an additional 50 km^2 of land around the so-called Koshi Barrage to India in 1966. Due to the high ecological value of the area and the prevalence of the endangered wild water buffalo, the Koshi Tappu Wildlife Reserve (KTWR) was created in 1976 and extended in 1979. In 1992, a buffer zone around the KTWR was proposed. Both projects – the Koshi Barrage and the KTWR – severely restricted the local population's access to wetland resources, such as land, grazing areas, wood, fish, various animal and plant species, and thatch grass. The wild buffalos, elephants and wild boars which populate the KTWR also frequently left the reserve, caused damage on surrounding fields and even attacked humans. Driven by environmental degradation in the Koshi floodplains, a high population density and growth (2.8%), the enclosure of former open access areas, and agricultural losses due to animal invasions, many inhabitants of Koshi Tappu entered the Koshi Barrage and especially KTWR illegally in order to utilize natural resources. This led to serious disputes with the local authorities, especially with KTWR staff. In addition, compensation for being resettled from barrage or reserve land was deemed inadequate by the affected persons and this issue was not settled until the escalation of the civil war in 2001.

Violence: 0
Physical violence was used, if at all, extremely seldom. Local inhabitants either formally protested against the reserve and inadequate compensation, or accessed the KTWR/Koshi Barrage illegally. The authorities managing and the military forces patrolling both areas also rarely resorted to violence, but either imposed fines or confiscate equipment/cattle.

External resource appropriation: 1
A large and significant part of the land, wood and fish resources of the Koshi wetlands was appropriated by the governments of Nepal and India, thus severely restricting access for the local population.

Power differences: 1
The KTWR and the Koshi Barrage officials commanded military personnel which patrolled the protected areas. They also received financial and political support from the government of Nepal, and in case of the barrage, from India. In 1987, the KTWR was declared a Ramsar wetland of international importance. This increased support for the reserve by the international community.

Recent political change: 0.67
Nepal experienced tremendous political changes during the 1990s. Multiparty democracy was introduced in 1990 and persisted until 2002 despite the onset of the civil war in 1996. However, no important changes regarding the resource regimes in Koshi Tappu (i.e. the contract with India or the conservation laws) occurred prior to or during the period under study.

Negative othering: 0

Although the relationship between the inhabitants of Koshi Tappu and the KTWR/Koshi Barrage authorities were tense since several decades, both parties did not conceive each other as inferior or a threat. According to various studies, large parts of the population rather liked than disliked the KTWR.

Place: Masina (Mali)
Time: 1991-2001

Short description of the case
Masina is a wetland area around the inner Niger delta in central Mali. It was characterized by a semi-arid climate and a comparatively high availability of water due to the perennial rivers Niger and Bani. The region is inhabited by small-scale farmers, agro-pastoralists, pastoralists and fishers. The farmers grow rice and other vegetables along the Niger and Bani floodplains. (Agro-) pastoral groups rely on burgu, which grows in deeper water than rice, as their dry season pasture. Rapid population growth, an increased drought frequency and intensity (particularly in the 1980s), and pro-agriculture policies prompted farmers to expand their fields, especially since the 1970s and again in the early 1990s. Agricultural expansion focused inter alia on the fertile areas, which became available due to the declining water level of the major rivers. This intensified competition between farmers about the most productive areas and between farmers and (agro-) pastoralists. The latter complained about the conversion of cattle corridors and burgu areas into farmland, while farmers were negatively affected by cattle invasions of their fields. Water and land scarcity, population growth and lower flood levels also encouraged conflicts between pastoralists moving into the floodplains in the dry season. The mediation of these conflicts was difficult within the weak and partially corrupt governance structures in Masina.

Violence: 0.33
The use of violence was frequent in land- and water-related disputes in Masina. However, no group used violence in a systematic manner and in the large majority of conflicts (>90%), no physical violence but rather formal complains and juridical procedures were used by the parties.

External resource appropriation: 0
There were no national parks in the area. A very limited amount of land was bought by urban elites and large rice farmers during the 1990s.

Power differences: 0
The power differences between the groups inhabiting Masina were rather low. Pastoralists had a slight advantage in terms of hard power since they commanded greater monetary revenues, which could be used to bribe courts and authorities. But under the government of Konaré (1992-2002) and Touré (2002-2012), agricultural developed was preferred vis-à-vis pastoralism (although the government had few means to implement this policy consequentially on the ground), thus giving farmers a small advantage in terms of relational power. No significant differences could be detected between the different farming communities or between different pastoral groups.

Recent political change: 1
Mali was transformed from an autocracy to a democracy between 1991 and 1993. The resulting weakness of the government in rural areas and efforts to decentralize the political system (including land-related authority) stimulated agricultural expansion in Masina and the related conflicts.

Negative othering: 0.33
Although farmers and pastoralists accused each other of undermining their respective livelihoods, the historical relations between the various groups, and especially between farming communities and between herding communities, were perceived as overwhelmingly positive. There existed cleavages between the various ethnic groups of the region (e.g. Bambara, Bozo, Fulani, Malinke, Songhay, Tuareg), but these were not very salient. Some pastoralists consider Rimaibé farmers deprecatingly as 'former slaves'.

Place: Mbeza (Zambia)
Time: 2002-2003

Short description of the case
Mbeza is a rural chiefdom in the semi-arid Namwala district of Zambia. The northern part of the area, and especially the floodplains of the Kafue River, is used by pastoralists from the Ila ethnic group to graze their cattle. Further south, various ethnic groups (including Ila, Batwa, and Tonga) sustain their livelihoods through agriculture. After a prolonged drought and associated food shortages in 2002, the chief of the area, Bright Nalubamla, proposed to establish an irrigation project. The project was supposed to facilitate irrigated agriculture around the Kafue floodplains. Although he secured donor and government support for the project, it faced resistance from local inhabitants, and particularly from Ila pastoralists. They feared that they would lose authority over the floodplain and access to the water resources and grazing lands located. After several months of local protest, the national government withdrew support for the project and it was eventually abandoned in 2003.

Violence: 0
Lobbying at higher political levels, formal petitions, press releases, rallying for local support, public protests and personal threats (including death threat) were the major actions used by the parties involved in the conflict. No incidents of physical violence are mentioned in the literature.

External resource appropriation: 0,67
At least 70% of the land in Zambia is traditionally owned and managed by customary institutions, but the percentage around Mbeza is likely to be lower. In addition, land privatization has significantly increased over the recent years due to higher prices (and higher external demand) for land and cattle. Many opponents of the irrigation project believed that the land would be sold to an external investor who will restrict or deny their access to the Kafue flats. Similarly, many supporters of the project hoped for employment opportunities once external commercial interests would invest in the area. Water of the Kafue is used further upstream for hydropower generation, commercial industry and agriculture.

Power differences: 0.33
Nalumbala owned a relatively high amount of relational power. He was the chief of the region, hold close connections to district, provincial and national authorities, and received support from the government and external donors. The anti-irrigation collation was superior in terms of hard power because it received much support from affluent households and was able to mobilize groups of protesters, which disturbed meetings of the pro-irrigation group and threatened Nalumbala.

Recent political change: 0.67
Sambia has been politically unstable during the 1990s, but the last major change of the political system prior to 2002 happened during democratization in 1990. The New Land Act of 1995 facilitated the privatization of land (especially by large-scale and foreign investors) and granted the local chiefs more power in land-related decisions. Especially in rural areas, the consequences of the New Land Act did not become obvious before the late 1990s or early 2000s.

Negative othering: 0.33
Historically, the relations between the various ethnic groups living in Mbeza were comparatively good, although some tensions existed. There were no strong perceptions of mutual threats or inferiority prior to the conflict. Some Ila perceived the authority of the chief as a relic from colonial rule and agricultural development as a threat to their pastoral livelihoods, while a group around Nalumbala claimed the pastoralists to be backward and greedy. There was no clear-cut

divide between the Ila and other ethnic groups because many non-pastoral Ila were in favor of the project, while some non-Ila opposed the irrigation scheme.

Place: Merka (India)
Time: 1995-2002

Short description of the case
Merka is a small village located on the Kutch peninsula (Gujarat state) in northwestern India. The area was characterized by an arid to semi-arid climate with a very short rain season and the absence of perennial rivers. Well accessible groundwater reservoirs, since 1995 complemented by government water supplies, enabled in combination with low population densities and well-defined adaptation strategies animal husbandry and agriculture. These were together with casual labor and migration the dominant livelihood strategies in Merka. Since around 20 years, groundwater tables in the region were falling due to overpumping, which gave rise to groundwater salinization. In addition, locals perceived an increase in soil degradation and drought frequency and/or intensity. This intensified the competition for scarce water resources between local groups, especially along lines of ethnicity, caste and class. The first and second type of conflict often occurred around water sources such as wells or tankers. The latter conflicts concerned the illegal appropriation of public water resources by rich (and often high-caste) households and sometimes the negative side effects of well drilling (e.g. sinking water tables, salinization).

Violence: 0
Some minor fistfights between different ethnic groups and castes were reported. These caused no fatalities and no violence was used in the large majority of the conflicts. The reasons for this included good social relations in the village in general and benevolent patronage relationships between wealthy and poor households.

External resource appropriation: 0.33
The wealthier households in Merka increasingly grew cash crops for external markets, especially cotton. The area under modern, irrigated agriculture had grown significantly in the years before and during the study period. But agricultural production for external markets still played a minor role in Merka, both in terms of water/land use and in terms of people employed.

Power differences: 0.67
In Merka, class differences often overlapped with caste differences, thus providing some households with considerable advantages in terms of hard power (wealth) and relational power (authority derived from traditional status). These differences are lessened by the decline of traditional caste structures and the increasing importance of political (party-based) cleavages as well as by the relevance of ethnicity in water-related conflicts.

Recent political change: 0.33
India was a stable parliamentary democracy during the 1990s and 2000s. The only relevant changes of the land and water regimes in Merka were an improved water supply by the state and more subsidies for modern agriculture (irrigation, pesticides, fertilizers etc.).

Negative othering: 0.33
Social relations in Merka were good despite a high heterogeneity in terms of class, caste, ethnicity, religion and political affiliation. Groups did not perceive each other as an (existential) threat to each other. Members of higher castes (e.g. Jadeja) often perceived lower-caste people (e.g. Harijan) as inferior. However, the caste system lost relevance in recent decades and notions of inferiority/impurity were blurred or not consistently applied. The traditional caste system also did not allow/justify the use of violence against lower castes.

Place: Northeastern Nigeria (Adamawa, Bauchi, Borno, Gombe, Jigawa, Plateau, Taraba, Yobe)
Time: 2000-2005

Short description of the case
The Northeastern part of Nigeria was largely arid to semi-arid with only its southern parts receiving sufficient rainfall to allow rain-fed agriculture. It was marked by a high ethnic heterogeneity and a large share of the population engaging in subsistence farming, pastoralism, or agro-pastoralism. Since the 1970s, there was a continuous trend towards precipitation decline, population growth (due to high fertility rates and immigration) and soil degradation (due to less rainfall, shorter fallow periods and the increasing use of marginal land). As a consequence, Fulani pastoralists were increasingly migrating from the northern to the still relatively wet southern parts of the area. This migration was either for extended periods of the year or even permanent. In consequence it caused resistance by the local, predominantly sedentary ethnic groups (e.g. Bade, Berom, Igbo, Tiv), which accepted traditional, short-term Fulani migration during the dry season, but feared land/water competition and cultural domination if the Fulani would stay in their homelands for longer periods. Farmers, on the other hand, started cultivating traditional or newly demarcated cattle movement corridors due to population growth and soil erosion. In addition, drying rivers and retreating lakes as well as the increasing pressure to utilize marginal lands drove competition between the pastoralist Fulani and sedentary ethnic groups around the seizure of former un- or underused areas. Finally, increasing pastoralist migration and extensive cultivation of marginal lands reduced the spatial distance between cattle herding and farming activities, thus increasing the risk for cattle invading fields. This frequently led to disputes concerning compensation and revenge as well as preemptive attacks by farmers against cattle herds or herders.

Violence: 0.67
The conflict between the Fulani and sedentary cultivators was frequent and both sides resorted to the use of direct, physical violence periodically. A larger number of incidents, which caused human fatalities, are well-documented in the literature. However, traditional conflict resolution mechanisms and also state institutions played a major role in settling many conflicts before violence was used.

External resource appropriation: 0.33
Cattle ranching and especially farming oriented towards serving external markets had expanded prior to 2000, driven by government efforts to promote commercialized agriculture. However, they still played only limited roles in the study area. Around 70% of the population sustained their livelihoods primarily through subsistence agriculture and the by far largest part of land and water resources was not used to serve external markets. In several places, the local populations faced limitations regarding access to land and water resources due to the existence of natural reserves, but complete exclusion from the reserves is rare.

Power differences: 0
The concrete power relations between Fulani pastoralists and sedentary farmers varied between the sub-regions of northeastern Nigeria (depending on geography and ethnic composition of the population, among others). Official land policies and land laws tended to be in favor of sedentary cultivators, but enforcement was weak in the region and there were also pro-pastoralist policies, such as the demarcation of grazing reserves and routes. Altogether, no crucial differences regarding hard or relational power between both groups could be identified.

Recent political change: 0.67
In 1998/1999, Nigeria experienced a transition from authoritarian military rule to democracy, which was accompanied by a strengthening of federalism. These changes hardly affected land- and water-related laws and policies as implemented in the northeastern part of the country.

Negative othering: 1
All studies agree that Fulani pastoralist and sedentary farmers conceived each other as a threat to the livelihood patterns and identities of the in-group at latest since the 1970s. This was by ethnic differences, the fear of Fulani cultural domination by the sedentary ethnic groups, and a history of violent incidences prior to 2000.

Place: Southern Oromiya (Ethiopia)
Time: 1995-2007

Short description of the case
The southern part of the Ethiopian regional state Oromiya is a vast, semi-arid area, which is marked by two long dry seasons per year. It was inhabited by various pastoralist ethnic groups, such as the Borana, the Digodi, the Gabbra, the Garri and the Guji, which frequently engaged in (violent) conflict with each other. There were various political, economic and cultural reasons for these disputes, which often involved competition over water, land and grazing resources as well as the raiding of cattle. These cattle raids were partially carried out in order to restock herds, which represented the key livelihoods of the nomadic pastoralists, after severe droughts. Competition around natural resources had intensified since the 1980s because of more frequent and intense droughts, pasture degradation, population growth and the encroachment of pasture due to land privatization and the sedentarization of pastoralists. More frequent or intense droughts also forced pastoralists to carry their herds further away from their homeland, thereby increasing the risk of clashing with hostile groups.

Violence: 1
While not all disputes about land and water resources were settled by means of violence, the frequency of extreme violence (causing human fatalities and involving the use of advanced weapons) was widespread in recent years. The reasons for this were the influx of (semi-) automatic weapons from southern Sudan and the weakening of traditional institutions responsible for conflict resolution.

External resource appropriation: 0.67
At latest since 1991, the Ethiopian government tried to open the southern periphery of the country for industrial agriculture and national as well as international markets. Since the 2000s, Ethiopia was well known as an important target of land grabbing. Around 24% of the land in the Borana zone was under private property in 2004, while Temesgen (2010) is able to list seven large-scale ranches in southern Oromiya occupying an area of around 684 km^2. Some major national reserves and national parks were also established in the area.

Power differences: 0
There were no significant differences regarding hard or soft power between the various ethnic groups inhabiting the region.

Recent political change: 1
Between 1991 and 1994, Ethiopia experienced a transition from the communist Derg regime to a democratic republic with a strong federalist system. This change contributed to the intensification of pastoralist conflicts in southern Oromiya in three ways. First, increasing efforts to privatize and commercialize agriculture in the region has increased resource scarcity and access problems for pastoralists. Second, efforts by the state to increase its presence in peripheral lowlands led to a weakening of traditional conflict resolution mechanisms without replacing them with proper state institutions. Finally, the principle of ethnic federalism (i.e. the idea to assign every ethnic group a fixed territory) implemented since 1991 led to increased territorial conflict between pastoral groups, particularly around key water points and grazing areas.

Negative othering: 0.67
The various pastoralist groups inhabiting the study area engaged in (partially violent) conflicts with each other since decades, if no centuries. There were established perceptions of each other as out-groups, which are at least potentially threatening the livelihoods and culture of the in-groups due to resource competition and a history of violent conflicts and revenge attacks. The

processes of negative othering between the various ethnic groups had intensified since the introduction of ethnic federalism in 1991. However, each group also owned collective memories of successful conflict mediation and even cooperation with other groups during certain (especially drought) periods. These collective memories alleviated the self-other antagonisms present between pastoralist groups in the study area.

Place: Southern Pará
Time: 1990-1996

Short description of the case
Pará is a state in the Amazon region of northern Brazil. The region was sparsely settled and large tracks of land were covered by pristine tropical forest in the 1990s, thus making land per se not scarce. However, large parts of Pará were still very remote and hardly accessible. Land around major roads and settlements was thus a scarce and valuable resource. Such land was highly concentrated in the hands of few influential persons and often used for cattle ranching. A large number of landless and extremely poor persons lived in the region. Many of them had migrated to Pará during various boom and bust cycles since the 19th century (e.g. rubber, Brazil nut, highway/infrastructure construction, and more recently mining). Pará's population had more than doubled between 1960 and 1990, mainly due to immigration from other regions of Brazil. The number of cattle in the region had sharply increased as well. Economic opportunities for poor people were extremely limited in the 1990s because the mining and infrastructure sectors were shrinking, while cattle ranching provided few jobs. At latest since the 1960s, the landless poor reacted to their desperate situation and increasing (often illegal and/or violent) land appropriations by large landowners with the direct occupation of idle land belonging to large landholders. After the democratization in 1985 and the appearance of the Landless Peasant Movement (MST) in Pará in 1989, land conflicts intensified in southern Pará. The number of land invasions sharply increased. Large landowners and local authorities often resisted it by hiring gunmen or drawing on police forces to harass land activists/squatters and expel them from the occupied land.

Violence: 1
The use of direct physical violence in land conflicts decreased between the mid-1980s and the mid-1990s. Nevertheless violence was still systematically employed by large land owners (sometimes in collusion with local authorities) against land reform activists and squatters occupying their properties. In 1996 alone, 33 land conflict-related murders were officially registered in the state of Pará (around two thirds of the victims were landless farmers).

External resource appropriation: 1
The gini coefficient for land distribution in Pará was already very high in 1967 (0.871) and increased to 0.889 in 1998. Effectively, millions of poor rural dwellers had no or insufficient access to land. Large landowners used their land primarily for cattle ranching, but also for logging and speculative purposes, all of which was directed towards external markets. There were several large hydro-power, mining and (weakly enforced) conservation areas in place.

Power differences: 1
Large landowners were significantly more powerful than landless groups in terms of hard and relational power. The latter were well organized through various organizations (such as the MST, rural unions or church-based organizations) and enjoyed some support from the National Institute for Colonization and Agrarian Reform (INCRA). Nevertheless the large landowners were also well organized in the Ruralist Democratic Union (UDR), received support from the local state administrations and police forces, had much more financial resources at their disposal, and were well connected or identical with local, regional and even national political elites.

Recent political change: 1
The democratization of Brazil in 1985 improved conditions for civil society organizations representing poor and landless groups, such as the MST. Military support for the evictions of squatters was reduced as well. The new constitution of 1988 strengthened formal property rights, including the land titles of large landholders. But it also confirmed the 1985 agrarian reform law,

which legalized the expropriation of land in case it was not productively used. These contradictive and not well-specified regulations raised expectations of both large landowners and poor/landless squatters.

Negative othering: 1
Landless and poor rural dwellers perceived the large landholders as an existential threat to their economic existence. The large landholders and parts of the local state administration and political elites considered members of MST and similar groups as dangerous, rebellious, communist, criminal and underdeveloped. The negative othering between both groups was intensified by narratives about violent, and often deadly land conflicts since 1835 and especially since the colonization of the area from the mid-1950s onwards.

Place: Tiraque (Bolivia)
Time: 2000-2004

Short description of the case
The Tiraque valley is a largely semi-arid area in the Bolivian Andeans. Local people overwhelmingly sustained their livelihoods through subsistence agriculture. During the dry season, they were heavily dependent on irrigation systems fed by highland lagoons and springs. One of such irrigation systems was shared by the three villages Qolqe Khoya, Sank'ayani Bajo and Sank'ayani Alto. Between 1999 and 2000, one of the sources of this irrigation system, the T'otorayoj reservoir, was upgraded. Since more water was available thereafter, the water sharing agreement between the three villages, which was operative since 1970, had to be re-negotiated. While Sank'ayani Alto, partially motivated by high population growth in recent years, opted for a change of the established water sharing rules, Qolqe Khoya and Sank'ayani Bajo preferred the old distributional rules, which were in their favor. In 2003, Qolqe Khoya and Sank'ayani Bajo unilaterally decided on a new water sharing agreement, leading Sank'ayani Alto to block and eventually divert some of the irrigation water destined for Qolqe Khoya and Sank'ayani Bajo. This led to mediation efforts by local authorities, physical confrontations between both parties and a court case. The court ruled in favor of Qolqe Khoya, but Sank'ayani Alto continued to ignore the judgment.

Violence: 0
There are reports about incidents of fistfights between the inhabitants of Qolqe Khoya/ Sank'ayani Bajo and Sank'ayani Alto, leaving several people injured. However, these fights were exceptionally severe events, did not involve the use of weapons and left no casualties. Clearly, non-violent strategies (e.g. diverting water, calling for local authorities, going to court) were strongly preferred by both parties.

External resource appropriation: 0
Water in Tiraque was mainly used for domestic and agricultural purposes. There was no industrial or hydropower water use in the area. The water was managed by local water user organizations which were strongly linked to the peasant unions (*sindicatos*). Irrigated agriculture was oriented towards subsistence or local markets.

Power differences: 0
Qolqe Khoya, Sank'ayani Bajo and Sank'ayani Alto were all agricultural villages of equal size with the same legal status. No significant differences regarding hard or soft power could be detected.

Recent political change: 0
Boliva was a stable democracy since 1982 and no important modifications of the political system happened prior to the irrigation conflict in Tiraque. The Bolivian government implemented some privatization policies during the 1990s, culminating in the privatization of the water supply system in Cochabamba (approximately 50km from Tiraque) and the subsequent violent clashes between state forces and anti-privatization protestors. However, the local irrigation and drinking water systems in the rural area around Qolqe Khoya were managed by the local water user or other community based organizations with very low state involvement, thus making the impact of these privatization policies on the irrigation conflict in Tiraque negligible.

Negative othering: 0
A water sharing agreement between the three villages was operative between 1970 and 1999. There are no signs of a perception of the other villagers as inferior or as a threat, with the partial exception of the people in Sank'ayani Alto considering the established water sharing rules as outdated and thus unfair.

Place: Tonle Sap
Time: 1993-2001

Short description of the case
Tonle Sap is a large lake in central Cambodia. It was the subject of considerable seasonal variation with the size of the lake being four times larger in November than in June. The flooded forests provided optimal breeding grounds for various fish species, making the lake one of the most productive fishing grounds worldwide. The shore and floodplains of Tonle Sap also provided good conditions for agriculture, and especially for rice cultivation. After the decay of the devastating civil war (1967-1991/1998), pressure on the fish, land and water resources in the Tonle Sap area increased dramatically. The large majority of the local population was poor and depended strongly on subsistence fishing or rice cultivation for their food security. The situation was aggravated by a rapid population growth and the increasing presence of large-scale, export oriented fisheries after the democratization and liberalization from 1993 onwards. The amount of annual catch decreased prior to and during the study period due to overfishing, deforestation and siltation, among others. The increasing competition over the area's natural resources lead to several concrete conflicts: First, large-scale commercial fisheries quarreled with small-scale subsistence fishers over the boundaries between their fishing areas and the rights of small-scale fishers to access commercial fishing lots in the closed season between June and October. Similar conflicts occurred between small-scale fishers. Second, farmers often stored the receding water in open ponds for irrigation, while the commercial fisheries claimed ownership of this water (and the fishes therein). Subsistence farmers also spurred deforestation and the expansion of rice fields in the floodplains of the lake, which was resisted by (commercial and subsistence) fishers because tree and shrub vegetation provided breeding grounds for fishes. Third, similar conflicts occurred between farmers, fishers and firewood collectors. The conflict dynamics in the region changed significantly when the government transformed more than 50% of the commercial fishing lots into public fishing grounds in 2001.

Violence: 0.67
Large-scale commercial fisheries paid private armed guards (and sometimes police or military forces) to protect their fishing lots (even in the closed season when they had no right to do so) and to limit agricultural expansion in the floodplains. Consequentially, these disputes regularly involved the use of guns, causing deaths and severe injuries. In disputes not involving large-scale fisheries, the use of physical violence occurred as well, but less often and less intensive. No violence was used in the majority of disputes.

External resource appropriation: 0.67
A significant amount of fish, land and water was controlled by the export-oriented commercial fisheries, which often extended the areas under their control forcefully and illegally. There were also several large-scale irrigated agricultural schemes around the lake, which produced crops for urban and foreign markets. This severely restricted the access of subsistence fishers and farmers to fish, land and water resources. However, vast tracks of lands and fishing grounds (especially during the closed season) were used for subsistence purposes.

Power differences: 0.67
The large-scale commercial fisheries had a much higher amount of hard power at their disposal since they were wealthier and could hire security forces. In terms of relational power, the advantages of the commercial fisheries in directly lobbying the relevant authorities was largely balanced by the support small-scale farmers and fishers received from civil society, public opinion and international actors (NGOs, scientists etc.).

Recent political change: 1
Cambodia experienced a transition from a command economy to a market economy from 1987 and especially from 1993 onwards. It also transformed from an occupied, war-torn socialist autocracy to a multiparty democracy between 1988 and 1998. Private property, including property of land, water and fishing areas, was introduced in 1989, while in the previous 14 years, the access to these resources was governed by collective schemes.

Negative othering: 0.33
Following the devastating civil war, the level of mistrust and perceived insecurity was relatively high in Cambodia during the 1990s. However, the concrete historical tensions between the various resource users around Tonle Sap were rather low, inter alia because most of them were ethnic Khmer and there was no commercial resource exploitation during the civil war. There are historical grievances, involving perceptions of threat and in-group superiority, between the Khmer majority and a Vietnamese minority around the lake.

Place: Turkana (Kenya)
Time: 2003-2009

Short description of the case
Turkana is an arid to semi-arid county in north-western Kenya. It was characterized by a high level of poverty, political and economic marginalization, and pastoralist livelihoods in 2003-2009. Violent conflicts over land, water and pasture as well as cattle raids between various ethnic groups (mostly Turkana and Pokot, but also Dodoth, Jie, Matheniko, Merille, Nyangatom, and Toposa) occurred in the region since centuries. However, in the last one to two decades, conflicts between pastoralist ethnic groups have increased in number and intensity. The reasons for this were manifold. More frequent droughts and less reliable precipitation intensified competition over water points and grazing areas. In times of drought, pastoralists also had to move with their herds further away from traditional dry season rangelands and close to or even into the territories hostile ethnic groups or contested borderlands. A common strategy to cope with the impacts of drought was also to raid the cattle of other ethnic groups. Adverse ecological changes added to the increasing availability of small arms (e.g. AK-47s) in the region due to the wars in neighboring Sudan, Uganda, Somalia, and Ethiopia. These weapons increased the number of fatalities in raids and resource-related conflicts, thus provoking retaliatory attacks by the affected groups. There was also an increasing external demand for cattle, which raised incentives for criminal groups to raid cattle and sell them on markets. Finally, the availability of modern weapons, political marginalization and poorly conceived development interventions had eroded the authority of traditional conflict resolution and mediation institutions (e.g. elders).

Violence: 1
Conflicts between the various pastoralist groups in Turkana involved a high level of direct, physical violence. CEWARN, for instance, registered 1,547 incidents of conflict causing 3,000 deaths in the period 2006-2009.

External resource appropriation: 0.33
The degree of external resource appropriation in Turkana was very low. There were no national parks and only few large-scale private ranching or agricultural schemes in the area. The higher external demand for cattle (for which land and water are important factors of production) increased incentives for commercial raids, i.e. the (often violent) stealing of cattle in order to sell it to urban businessmen. But the large majority of cattle in the area was not traded on markets but used for subsistence pastoralism.

Power differences: 0
Following disarming operations, some ethnic groups, clans or villages were temporarily considerable weakened in terms of hard power. However, no significant differences regarding hard or soft power could be detected over longer time periods.

Recent political change: 0.67
Kenya experienced a period of democratization and political as well as economic liberalization prior to 2003. This started with the return to multi-party politics in 1991 and ended with the electoral defeat of Daniel arap Moi in 2002.

Negative othering: 1
Intergroup violence was widespread in the region for decades if not centuries. The ethnic groups in the area, especially the Turkana and the Pokot, viewed each other as enemies and a threat to the in-group. Large grazing areas were no longer used due fears that the own group could be attacked by other ethnic groups. A culture of violence existed according to which the killing of an enemy during a raid was considered as a heroic deed.

Appendix VI: Truth table, data matrices and replication data (chapter 4)

Truth table for the main analysis

ext appro	power diff	polit chang	nega oth	number	raw consist.	PRI consist.	SYM consist	best instances
1	1	1	0	4	0.332500	0.112957	0.112957	Chom Thong, Galapágos, Koshi Tappu, Tonle Sap
0	0	1	1	3	0.858065	0.752809	0.752809	Jabal Sabr, Northeastern Nigeria, Turkana
1	0	1	0	3	0.578947	0.282051	0.282051	Kalimantan, Kilosa, Mbeza
1	1	1	1	2	0.545205	0.375940	0.375940	Dir Kohistan, Southern Pará
0	1	0	0	2	0.124060	0.000000	0.000000	Condega, Merka
1	1	0	0	1	0.199396	0.000000	0.000000	Guerdane
1	0	1	1	1	0.833753	0.668342	0.668342	Southern Oromiya
0	0	1	0	1	0.697885	0.397590	0.397590	Masina
1	0	0	1	1	0.800604	0.668342	0.668342	Guadalcanal
1	0	0	0	1	0.622642	0.397590	0.397590	Ferghana Valley
0	0	0	0	1	0.442953	0.284483	0.284483	Tiraque
0	1	1	1	0				
0	1	1	0	0				
1	1	0	1	0				
0	1	0	1	0				
0	0	0	1	0				

Data matrix for the main analysis

Case	ExtAppro	PowerDiff	PolitChang	NegaOth	Viol
Chom Thong	0,67	1	0,67	0,33	0
Condega	0	1	0	0	0
Dir Kohistan	1	0,67	0,67	0,67	0,33
Ferghana Valley	0,67	0	0,33	0,33	0,33
Galapágos	1	1	0,67	0,33	0
Guadalcanal	0,67	0	0	0,67	1
Guerdane	1	1	0	0	0
Jabal Sabr	0,33	0	0,67	0,67	1
Kalimantan	0,67	0	1	0,33	0,33
Kilosa	0,67	0,33	0,67	0,33	0,33
Koshi Tappu	1	1	0,67	0	0
Masina	0	0	1	0,33	0,33
Mbeza	0,67	0,33	0,67	0,33	0
Merka	0,33	0,67	0,33	0,33	0
Northeastern Nigeria	0,33	0	0,67	1	0,67
Southern Oromiya	0,67	0	1	0,67	1
Southern Pará	1	1	1	1	1
Tiraque	0	0	0	0	0
Tonle Sap	0,67	0,67	1	0,33	0,67
Turkana	0,33	0	0,67	1	1

Data matrix for the robustness tests

Case	lowdev	edu	polsystchang	resregchang
Chom Thong	0,33	1	0	1
Condega	0	0,67	0	0
Dir Kohistan	0,67	0,67	1	0
Ferghana Valley	0,33	0,67	0	0
Galapágos	0,33	1	0	1
Guadalcanal	0	1	0	0
Guerdane	0	0	0	0
Jabal Sabr	0,67	0	1	0
Kalimantan	0	0,67	1	1
Kilosa	0,33	0,67	0	1
Koshi Tappu	0,67	0,67	1	0
Masina	1	0,33	1	1
Mbeza	0,67	0,33	0	1
Merka	0,33	0,33	0	0
Northeastern Nigeria	1	0,33	1	0
Southern Oromiya	1	0	1	1
Southern Pará	0,33	0,33	1	1
Tiraque	0,33	0	0	0
Tonle Sap	0,67	0	1	1
Turkana	0,67	0,33	1	0

Calibration of and original data for development and education

Case	child (under 5) mortality rate (per 1,000)	set-membership development	% of population which completed primary education	set-membership education
Chom Thong	51	0,33	73,3	1
Condega	29	0	27	0,67
Dir Kohistan	132,8	0,67	26,2	0,67
Ferghana Valley	61,9	0,33	27,7	0,67
Galapágos	99,3	0,33	70,9	1
Guadalcanal	35	0	78,5	1
Guerdane	47	0	1,3	0
Jabal Sabr	122,3	0,67	4,5	0
Kalimantan	43,5	0	27,8	0,67
Kilosa	99,2	0,33	32,7	0,67
Koshi Tappu	112,8	0,67	31	0,67
Masina	325,3	1	12,5	0,33
Mbeza	148	0,67	17,3	0,33
Merka	85,1	0,33	18,4	0,33
Northeastern Nigeria	217,6	1	12,7	0,33
Southern Oromiya	193,8	1	1,9	0
Southern Pará	80,2	0,33	11,1	0,33
Tiraque	89	0,33	6,5	0
Tonle Sap	130,7	0,67	4,5	0
Turkana	121	0,67	14,8	0,33

Data source: Demographic and Health Survey (DHS) Program, http://www.dhsprogram.com/Publications/Publications-by-Country.cfm (21/03/2014).

Appendix VII: Publications produced during the PhD study

- Ide, Tobias (2015): Sicherheitsgefahr Ressourcenfluch: Zum Zusammenhang von Ressourcenreichtum und innerstaatlichen Gewaltkonflikten. In: Jäger, Thomas (ed.): Handbuch Sicherheitsgefahren. Wiesbaden: VS-Verlag, 43-52.
- Ide, Tobias/Schilling, Janpeter/Link, Jasmin S.A./Scheffran, Jürgen/Ngaruiya, Grace/Weinzierl, Thomas (2014): On exposure, vulnerability and violence: spatial distribution of risk factors for climate change and violent conflict across Kenya and Uganda. *Political Geography 43 (1)*, forthcoming.
- Ide, Tobias/Scheffran, Jürgen (2014): On climate, conflict and cumulation: suggestions for integrative cumulation of knowledge in the research on climate change and violent vonflict. *Global Change, Peace & Security 26 (3)*, 263-279.
- Ide, Tobias/Scheffran, Jürgen/Schilling, Janpeter (2012): Führt der Klimawandel zu mehr Gewaltkonflikten? *Wissenschaft und Frieden 30 (3)*, 7-9.
- Ide, Tobias (2012): Kriege und Gewaltkonflikte als Folge des Klimawandels? In: Christ, Tamina/Gellrich, Angelika/Ide, Tobias (eds.): Zugänge zur Klimadebatte in Politikwissenschaft, Soziologie und Psychologie. Marburg: Metropolis, 169-196.
- Scheffran, Jürgen/Ide, Tobias/Schilling, Janpeter (2014): Violent climate or climate of violence? Concepts and relations with focus on Kenya and Sudan. *International Journal of Human Rights 18 (3)*, 369-390.

References

Abbass, Isah Mohammed (2012): No retreat, no surrender: conflict for survival between Fulani pastoralists and framers in northern Nigeria. European Scientific Journal 8(1), p. 331-346.

Abdelal, Rawi/Herrera, Yoshiko/Johnston, Alastair Ian/McDermott, Rose (2006): Identity as a variable. Perspectives on Politics 4(4), p. 695-711.

Abdulahi, Mohammud (2005): The changing nature of pastoral conflicts in south-eastern Ethiopia: the case of the Boran and Digodi pastoralists. Nairobi: APF.

AbuZaid, Khaled/Abdel-Meguid, Amr (2006): Water conflicts and conflict management mechanisms in the Middle East and North Africa region. Cairo: CEDARE.

Achen, Christopher H. (2005): Let's put garbage-can regressions and garbage-can probits where they belong. Conflict Management and Peace Science 22(4), p. 327-339.

Adano, Wario/Dietz, Ton/Witsenburg, Karen M./Zaal, Fred (2012): Climate change, violent conflict and local institutions in Kenya's dryland. Journal of Peace Research 49(1), p. 65-80.

Adger, W. Neil (2006): Vulnerability. Global Environmental Change 16(3), p. 268-281.

Agnew, John (1994): The territorial trap: the geographical assumptions of international relations theory. Review of International Political Economy 1(1), p. 53-80.

Akcinaroglu, Seden/DiCicco, Jon/Radziszewski, Elizabeth (2011): Avalanches and olive branches: a multimethod analysis of disasters and peacemaking in interstate rivalries. Political Research Quarterly 64(2), p. 260-275.

Al-Kaisi, Mahdi (2000): Soil erosion: an agricultural production challenge. Integrated Crop Management 484(19), p. 141-143.

Al-Shaybani, Said R./al-Zubayri, Abdul Salaam (2005): Water conflicts: Taiz and Tuban case study. Sana'a: World Bank.

Alatout, Samer (2006): Towards a bio-territorial conception of power: territory, population, and environmental narratives in Palestine and Israel. Political Geography 25(6), p. 601-621.

Ali, Saleem (2007): A natural connection between ecology and peace? In: Ali, Saleem (ed.): *Peace parks: conservation and conflict resolution*. Cambridge: Cambridge University Press, p. 1-18.

Allan, John Anthony (2002): Hydro-peace in the Middle East: why no water wars? A case study of the Jordan river basin. SAIS Review 22(2), p. 255-272.

Allegretti, Arren Mendezona/Vaske, Jerry J./Finchum, Ryan (2012): Conflict and normative sanctions among Galapagos fishermen. In: Fisher, Cherie LeBlanc/Watts, Clifton E. (eds.): *Proceedings of the 2010 Northeastern Recreation Research Symposium*. Newton Square: US Forest Service, p. 91-97.

Allen, Matthew (2012): Land, identity and conflict on Guadalcanal, Solomon Islands. Australian Geographer 43(2), p. 163-180.

Allen, Matthew G. (2013): Melanesia's violent environments: towards a political ecology of conflict in the western Pacific. Geoforum 44(1), p. 152-161.

Alston, Lee J./Libecap, Gary D./Mueller, Bernardo (2000): Land reform policies, the sources of violent conflict, and implications for deforestation in the Brazilian Amazon. Journal of Environmental Economics and Management 39(2), p. 162-188.

Amery, Hussein (2002): Water wars in the Middle East: a looming threat. The Geographical Journal 168(4), p. 313-323.

Anderson, Craig (2001): Heat and violence. Current Directions in Psychological Science 10(1), p. 33-38.

Anderson, Craig/DeLisi, Matt (2011): Implications of global climate change for violence developed and developing countries. In: Forgas, Joseph/Kruglanski, Arie/Williams, Kipling (eds.): *The Psychology of Social Conflict and Aggression*. New York: Psychology Press, p. 249-265.

Assies, Willem (2003): David versus Goliath in Cochabamba: water rights, neoliberalism, and the revival of social protest in Bolivia. Latin American Perspectives 30(3), p. 14-36.
Aviram, Ram/Katz, David/Shmueli, Deborah (2014): Desalination as a game-changer in transboundary hydro-politics. Water Policy 16(4), p. 609-624.
Azuwike, Okechi Dominic/Enverem, Evan (2010): Nigeria's changing environment and pastoral nomadism: redistribution of pains and gains. Presented at the Berlin Conference on the Social Dimensions of Global Environmental Change, Berlin, 08-09/10/2010.
B'Tselem (2013): The gap in water consumption between Palestinians and Israelis. http://www.btselem.org/water/consumption_gap (08/08/2013).
Bächler, Günther (1998): Why environmental transformations causes violence: a synthesis. Environmental Change and Security Project Report 4(1), p. 24-44.
Bächler, Günther/Böge, Volker/Klötzi, Stefan (1996): *Kriegsursache Umweltzerstörung: Ökologische Konflikte in der Dritten Welt und Wege ihrer Bearbeitung*. Chur: Rüegger.
Bächler, Günther/Spillmann, Kurt (eds.) (1996): *Kriegsursache Umweltzerstörung: Regional- und Länderstudien von Projektmitarbeitern*. Chur: Rüegger.
Baha, Bernard/Attito, Thomas/Axwesso, Stephen/Luhwago, Rodgers/Charles, Baraka (2008): The price of a malfunctioning land management system in Tanzania: a fact finding report on the dispute between pastoralists and peasants in Kilosa district. Dar es Salaam: Haki Ardhi.
Bar-Tal, Daniel (1998): Societal beliefs in times of intractable conflict: the Israeli case. International Journal of Conflict Management 9(1), p. 22-50.
Barber, Charles Victor (1998): Forest resource scarcity & social conflict in Indonesia. Environment 40(4), p. 4-9, 28-37.
Barnett, Jon (2000): Destabilizing the environment-conflict thesis. Review of International Studies 26(2), p. 271-288.
Barnett, Jon/Adger, W. Neil (2007): Climate change, human security and violent conflict. Political Geography 26(6), p. 639-655.
Baron, Robert A. (1990): Conflict in organizations. In: Murphy, Kevin R./Saal, Frank E. (eds.): *Psychology in organizations: integrating science and practice*. Hillsdale: Lawrence Erlbaum, p. 197-216.
Barquet, Karin/Lujala, Päivi/Rød, Jan Ketil (2014): Transboundary conservation and militarized interstate disputes. Political Geography 42(1), p. 1-11.
Bartels, Larry M. (2004): Some unfulfilled promises of quantitative imperialism. In: Brady, Henry E./Collier, David (eds.): *Rethinking social inquiry: diverse tools, shared standards*. Lanham: Rowman & Littlefield, p. 69-74.
Basedau, Matthias/Richter, Thomas (2014): Why do some oil exporters experience civil war but others do not?: investigating the conditional effects of oil. European Political Science Review 6(4), p. 549-574.
Battisti, David S./Naylor, Rosamond L. (2009): Historical warnings of future food insecurity with unprecedented seasonal heat. Science 323(5911), p. 240-244.
Beck, Nathaniel (2010): Causal process "observation": oxymoron or (fine) old wine. Political Analysis 18(4), p. 499-505.
Bednarz, Sarah Witham (2004): Geographic Information Systems: a tool to support geography and environmental education? GeoJournal 60(2), p. 191-199.
Benjaminsen, Tor A. (2008): Does supply-induced scarcity drive violent conflicts in the African Sahel? The case of the Tuareg rebellion in northern Mali. Journal of Peace Research 45(6), p. 819-836.
Benjaminsen, Tor A./Ba, Boubacar (2009): Farmer-herder conflicts, pastoral marginalisation and corruption: a case study from the inland Niger delta of Mali. Geographical Journal 175(1), p. 71-81.

Benjaminsen, Tor A./Maganga, Faustin P./Abdallah, Jumanne Moshi (2009): The Kilosa killings: political ecology of a farmer-herder conflict in Tanzania. Development and Change 40(3), p. 423-445.

Benjaminsen, Tor/Alinon, Koffi/Buhaug, Halvard/Buseth, Jill Tove (2012): Does climate change drive land-use conflict in the Sahel? Journal of Peace Research 49(1), p. 97-111.

Bennet, Andrew (2004): Case study methods: design, use, and comparative advantages. In: Sprinz, Detlef S./Wolinsky-Nahmias, Yael (eds.): *Models, numbers, and cases: methods for studying international relations*. Ann Arbor: University of Michigan Press, p. 19-55.

Bennet, Judith (2002): Roots of conflict in Solomon Islands: though much is taken, much abides: legacies of tradition and colonialism. Canberra: Australian National University.

Bennett, D. Scott/Stam, Allan C. (2004): *The behavioral origins of war*. Ann Arbor: University of Michigan Press.

Berg-Schlosser, Dirk/de Meur, Gisèle (2009): Comparative research design: case and variable selection. In: Rihoux, Benoît/Ragin, Charles C. (eds.): *Configurational comparative methods: Qualitative Comparative Analysis (QCA) and related techniques*. Thousand Oaks: Sage, p. 19-32.

Berg-Schlosser, Dirk/de Meur, Gisèle/Rihoux, Benoît/Ragin, Charles C. (2009): Qualitative Comparative Analysis (QCA) as an approach. In: Rihoux, Benoît/Ragin, Charles C. (eds.): *Configurational comparative methods: Qualitative Comparative Analysis (QCA) and related techniques*. Thousand Oaks: Sage, p. 1-18.

Bergholt, Drago/Lujala, Päivi (2012): Climate-related natural disasters, economic growth, and armed civil conflict. Journal of Peace Research 49(1), p. 147-162.

Bernauer, Thomas/Böhmelt, Tobias/Koubi, Vally (2012): Environmental changes and violent conflict. Environmental Research Letters 7(1), p. 1-8.

Berrebi, Claude/Ostwald, Jordan (2011): Earthquakes, hurricanes, and terrorism: do natural disasters incite terror? Public Choice 149(3), p. 383-403.

Besley, Timothy/Persson, Torsten (2011): The logic of political violence. The Quarterly Journal of Economics 126(3), p. 1411-1445.

Bevan, James (2008): Crisis in Karamoja: armed violence and the failure of disarmament in Uganda's most deprived region. Geneva: Small Arms Survey.

Bhaskar, Roy (ed.) (1997): *A realist theory of science*. London: Verso.

Bichsel, Christine (2009a): *Conflict transformation in Central Asia: irrigation disputes in the Ferghana valley*. London/New York: Routledge.

Bichsel, Christine (2009b): It's about more water: natural resource conflicts in Central Asia. In: Péclard, Didier (ed.): *Environmental peacebuilding: managing natural resource conflicts in a changing world*. Bern: swisspeace, p. 32-40.

Bieling, Hans-Jürgen (2007): *Internationale Politische Ökonomie: eine Einführung*. Wiesbaden: VS-Verlag.

Biermann, Frank/Petschel-Held, Gerhard/Rohloff, Christian (1998): Umweltzerstörung als Konfliktursache? Theoretische Konzeptionalisierung und empirische Analyse des Zusammenhangs von >>Umwelt<< und >>Sicherheit<<. Zeitschrift für Internationale Beziehungen 5(2), p. 273-308.

Black, Richard/Bennett, Stephen/Thomas, Sandy M./Beddington, John R. (2011): Migration as adaptation. Nature 478(7370), p. 447-449.

Blondel, Alice (2012): Climate change fuelling resource-based conflicts in the Asia-Pacific. New York: UNDP.

Bobrow-Strain, Andrew (2001): Between a ranch and a hard place: violence, scarcity, and meaning in Chiapas, Mexico. In: Peluso, Nancy Lee/Watts, Michael (eds.): *Violent Environments*. Ithaca: Cornwell University Press, p. 155-185.

Bocchi, Stefano/Disperati, Stefano/Rossi, Simone (2006): Environmental security: a Geographic Information System analysis approach - the case of Kenya. Environmental Management 37(2), p. 186-199.

Bogale, Ayalneh/Korf, Benedikt (2007): To share or not to share? (Non-)Violence, scarcity and resource access in Somali Region, Ethiopia. Journal of Development Studies 43(4), p. 743-765.

Böhm, Andreas (2012): Theoretisches Codieren: Textanalyse in der Grounded Theory. In: Flick, Uwe/von Kardorff, Ernst/Steinke, Ines (eds.): *Qualitative Forschung: ein Handbuch*. Reinbek: Rowohlt,

Böhmelt, Tobias/Bernauer, Thomas/Buhaug, Halvard/Gleditsch, Nils Petter Gleditsch/Tribaldos, Theresa/Wischnath, Gerdis (2014): Demand, supply, and restraint: determinants of domestic water conflict and cooperation. Global Environmental Change, forthcoming.

Bonacker, Thorsten/Imbusch, Peter (2010): Zentrale Begriffe der Friedens- und Konfliktforschung: Konflikt, Gewalt, Krieg, Frieden. In: Imbusch, Peter/Zoll, Ralf (eds.): *Friedens- und Konfliktforschung: eine Einführung*. Wiesbaden, p. 67-142.

Bonheur, Neou/Lane, Benjamin D. (2002): Natural resources management for human security in Cambodia's Tonle Sap biosphere reserve. Environmental Science & Policy 5(1), p. 33-41.

Brady, Henry E. (2004): Data-set observations versus causal-process observations: the 2000 U.S. presidential election. In: Brady, Henry E./Collier, David (eds.): *Rethinking social inquiry: diverse tools, shared standards*. Lanham: Rowman & Littlefield, p. 267-271.

Brady, Henry E./Collier, David/Seawright, Jason (2004): Refocusing the discussion of methodology. In: Brady, Henry E./Collier, David (eds.): *Rethinking social inquiry: diverse tools, shared standards*. Lanham: Rowman & Littlefield, p. 3-20.

Branford, Sue/Rocha, Jan (2002): *Cutting the wire: the story of the landless movement in Brazil*. London: Latin American Bureau.

Brauch, Hans Günter (2009): Securitizing global environmental change. In: Brauch, Hans Günter/Spring, Úrsula Oswald/Grin, John/Mesjasz, Czeslaw/Kameri-Mbote, Patricia/Behera, Navnita Chadha/Chourou, Béchir/Krummenacher, Heinz (eds.): *Facing global environmental change: environmental, human, energy, food, health and water security concepts*. Berlin/Heidelberg: Springer, p. 65-104.

Braumoeller, Bear F./Goertz, Gary Goertz (2003): The statistical methodology of necessary conditions. In: Goertz, Gary/Starr, Harvey (eds.): *Necessary conditions: theory, methodology, and applications*. Lanham: Rowman & Littlefield, p. 197-223.

Braumoeller, Bear F./Sartori, Anne E. (2004): The promise and perils of statistics in International Relations. In: Sprinz, Detlef/Wolinsky-Namias, Yael (eds.): *Models, numbers, and cases: methods for studying international relations*. Ann Arbor: University of Michigan Press, p. 129-151.

Braun, Robert (2011): The diffusion of racist violence in the Netherlands: discourse and distance. Journal of Peace Research 48(6), p. 753-766.

Bremner, Jason/Perez, Jaime (2002): A case study of human migration and the sea cucumber crisis in the Galapagos Islands. AMBIO 31(4), p. 306-310.

Brenner, Neil (2008): Tausend Blätter: Bemerkungen zu den Geographien ungleicher räumlicher Entwicklung. In: Wissen, Markus/Röttger, Bernd/Heeg, Susanne (eds.): *Politics of scale: Räume der Globalisierung und Perspektiven emanzipatorischer Politik*. Münster: Westfällisches Dampfboot, p. 57-84.

Bretthauer, Judith M. (2014): Conditions for peace and conflict: applying a fuzzy-set Qualitative Comparative Analysis to cases of resource scarcity. Journal of Conflict Resolution 58, forthcoming.

Brown, Ian A. (2010): Assessing eco-scarcity as a cause of the outbreak of conflict in Darfur: a remote sensing approach. International Journal of Remote Sensing 31(10), p. 2513-2520.

Brown, Oli/Crawford, Alec (2009): *Rising temperatures, rising tensions: climate change and the risk of violent conflict in the Middle East*. Winnipeg: International Institute for Sustainable Development.

Brown, Taylor (2005): Contestation, confusion and corruption: market-based land reforms in Zambia. In: Evers, Sandra/Spierenburg, Marja/Wels, Harry (eds.): *Competing jurisdictions: settling land claims in Africa*. Leiden/Boston.: Koninglijke Brill, p. 79-102.

Brückner, Markus/Ciccone, Antonio (2010): International commodity prices, growth, and the outbreak of civil war in Sub-Saharan Africa. The Economic Journal 120(5), p. 519-534.

Bryman, Alan (2012): *Social science research methods*. New York: Oxford University Press.

Brzoska, Michael (2009): The securitization of climate change and the power of conceptions of security. Security & Peace 27(3), p. 137-145.

Buckley-Zistel, Susanne (2006): In-between war and peace: identities, boundaries, and change after violent conflict. Millenium 35(1), p. 3-21.

Buhaug, Halvard (2010): Climate not to blame for African civil wars. PNAS 107(38), p. 16477–16482.

Buhaug, Halvard (2014): Concealing agreements over climate-conflict results. PNAS 111(6), p. E636.

Buhaug, Halvard/Benjaminsen, Tor A./Sjaastad, Espen/Theisen, Ole Magnus (2012): Food insecurity and violent vonflict in Sub-Saharan Africa. Presented at the Workshop Rethinking Climate Change, Conflict and Security, Sussex, 18-19/10/2012.

Buhaug, Halvard/Gates, Scott (2002): The geography of civil war. Journal of Peace Research 39(4), p. 417-433.

Buhaug, Halvard/Gleditsch, Nils Petter Gleditsch/Theisen, Ole Magnus (2010): Implications of climate change for armed conflict. In: Mearns, Robin/Norton, Andrew (eds.): *Social dimensions of climate change: equity and vulnerability in a warming world*. Washington DC: World Bank, p. 75-101.

Buhaug, Halvard/Nordkvelle, Jonas/Bernauer, Thomas Bernauer/Böhmelt, Tobias/Brzoska, Michael/Busby, Joshua W./Ciccone, Antonio/Fjelde, Hanne/Gartzke, Erik/Gleditsch, Nils Petter/Goldtsone, Jack A./Hegre, Håvard/Holtermann, Helge/Koubi, Vally/Link, P. Michael /Link, Jasmin S. A./Lujala, Päivi/O'Loughlin, John/Raleigh, Clionadh/Scheffran, Jürgen/Schilling, Janpeter/Smith, Todd G./Theisen, Ole Magnus/Tol, Richard S. J./Urdal, Henrik/von Uexkull, Nina (2014): One effect to rule them all? A comment on climate and conflict. Climatic Change, forthcoming.

Buhaug, Halvard/Theisen, Ole Magnus (2012): On environmental change and armed conflict. In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.): *Climate Change, Human Security and Violent Conflict: Challenges for Societal Stability*. Berlin: Springer, p. 43-55.

Bürgin, Reiner (2000): *'Hill tribes' and forests: minority policies and resource conflicts in Thailand*. Freiburg: SEFUT.

Burke, Marshall B./Miguel, Edward/Satyanath, Shanker /Dykema, John A./Lobell, David B. (2009): Warming increases the risk of civil war in Africa. PNAS 106(49), p. 20670–20674.

Burnham, Peter/Gilland, Karin/Grant, Wyn/Layton-Henry, Zig (2004): *Research methods in politics*. Hampshire/New York: Palgrave.

Burningham, Kate/Fielding, Jane/Thrush, Diana (2008): 'It'll never happen to me': understanding public awareness of local flood risk. Disasters 32(2), p. 216-238.

Busby, Joshua W./Cook, Kerry H./Vizy, Edward K./Smith, Todd/Bekalo, Mesfin (2014): Identifying hot spots of security vulnerability associated with climate change in Africa. Climatic Change 124(4), p. 717-731.

Busby, Joshua W./Smith, Todd G./White, Kaiba L./Strange, Shawn M. (2012): Locating climate insecurity: where are the most vulnerable places in Africa? In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin: Springer, p. 463-511.

Busby, Joshua W./Smith, Todd G./White, Kaiba L./Strange, Shawn M. (2013): Climate change and insecurity: mapping vulnerability in Africa. International Security 37(4), p. 132-172.

Butler, Christopher K./Gates, Scott (2012): African range wars: climate, conflict, and property rights. Journal of Peace Research 49(1), p. 23-34.
Buzan, Barry/Wæver, Ole/de Wilde, Jaap (1998): *Security: a new framework for analysis*. Boulder: Lynne Rienner.
Campbell, David (2005): *Writing security: United States foreign policy and the politics of identity*. Manchester: Manchester University Press.
Campbell, Ivan/Dalrymple, Sarah/Rob, Craig/Crawford, Alec (2009): *Climate change and conflict: lessons from community conservancies in northern Kenya*. Winnipeg: IISD.
Carius, Alexander (2006): Environmental peacemaking: environmental cooperation as an instrument of crisis prevention and peacebuilding: condition for success and constraints. Berlin: Adelphi.
Carius, Alexander/Tänzler, Dennis/Winterstein, Judith (2006): *Weltkarte von Umweltkonflikten*. Berlin: Adelphi.
Cederman, Lars-Erik/Min, Brian/Wimmer, Andreas (2010): Why do ethnic groups rebel? New data and analysis. World Politics 62(1), p. 87-119.
Celata, Filippo/Sanna, Venere Stefania (2012): The post-political ecology of protected areas: nature, social justice and political conflicts in the Galápagaos Islands. Local Environment 17(9), p. 977-990.
CEWARN (2010): CEWARN country updates. http://www.cewarn.org/index.php?option=com_docman&task=cat_view&gid=112&Itemid=98 (16/11/2013).
Chatterjee, Ipsita (2012): How are they othered? Globalisation, identity and violence in an Indian city. The Geographic Journal 178(2), p. 134-146.
Checkel, Jeffrey T. (2008): Process tracing. In: Klotz, Audie/Prakash, Deepa (eds.): *Qualitative methods in international relations : a pluralist guide*. Basingstoke: Palgrave, p. 114-127.
Chenoweth, Erica/Cunningham, Kathleen Gallagher (2013): Understanding nonviolent resistance: an introduction. Journal of Peace Research 50(3), p. 271-276.
Chojnacki, Sven/Engels, Bettina (2013): Material determinism and beyond: spatial categories in the study of violent conflict. SFB Working Paper 55. Berlin: SFB.
Chojnacki, Sven/Ickler, Christian/Spies, Michael/Wiesel, John (2012): Event data on armed conflict and security: new perspectives, old challenges, and some solutions. International Interactions 38(4), p. 382-401.
CIA (2012): The world factbook: GDP - composition by sector. https://www.cia.gov/library/publications/the-world-factbook/fields/2012.html (12/11/2012).
Collier, David/Brady, Henry E./Seawright, Jason (2010): Outdated views of qualitative methods: time to move on. Political Analysis 18(4), p. 506-513.
Conca, Ken (2002): The case for environmental peacemaking. In: Conca, Ken/Dabelko, Geoffrey (eds.): *Environmental peacemaking*. Baltimoore: John Hopkins University Press, p. 1-22.
Conca, Ken/Carius, Alexander/Dabelko, Geoffrey (2005): Building peace through environmental cooperation. In: Worldwatch Institute (ed.): *State of the world 2005: redefining global security*. Washington DC: Worldwatch, p. 144-157.
Conca, Ken/Dabelko, Geoffrey (2002a): The problems and possibilities of environmental peacemaking. In: Conca, Ken/Dabelko, Geoffrey (eds.): *Environmental peacemaking*. Baltimoore: John Hopkins University Press, p. 220-233.
Conca, Ken/Dabelko, Geoffrey D. (eds.) (2002b): *Environmental peacemaking*. Baltimoore: John Hopkins University Press.
Conca, Ken/Wallance, Jennifer (2012): Environment and peacebuilding in war-torn societies: lessons form the UN environment programme's experience with post-conflict assessment. In: Jensen, David/Lonergan, Steve (eds.): *Assessing and restoring natural resources in post-conflict peacebuilding*. London: Earthscan, p. 63-84.

Connell, John (2006): 'Saving the Solomons': a new geopolitics in the 'arc of instability'? Geographical Research 44(2), p. 111-122.
Corbin, Juliet/Strauss, Anselm L. (2008): *Basics of qualitative research: techniques and procedures for developing grounded theory*. London: Sage.
Coskun, Bezen Balamir (2009): Cooperation on water resources as a tool for desecuritzation. European Journal of Economic and Political Studies 2(2), p. 97-115.
Cossio, Vladimir/Soto, Lía/Skielboe, Thomas (2010a): The case of the Koari channel, Tiraque, Bolivia. Conflict and cooperation in local water governance case study report 2. Copenhagen: DIIS.
Cossio, Vladimir/Soto, Lía/Skielboe, Thomas (2010b): The case of the Tiraque highland irrigation conflict, Tiraque, Bolivia. Conflict and cooperation in local water governance case study report 1. Copenhagen: DIIS.
Cotula, Lorenzo/Cissé, Salmana (2006): Changes in 'customary' resource tenure systems in the inner Niger Delta, Mali. Journal of Legal Pluralism and Unofficial Law 38(52), p. 1-29.
Couttenier, Mathieu/Soubeyran, Raphael (2013): Drought and civil war in Sub-Saharan Africa. The Economic Journal 124(1), p. 201-244.
Cramer, Christopher (2002): *Homo Economicus* goes to war: methodological individualism, rational choice and the political economy of war. World Development 30(11), p. 1845-1864.
Crooker, Richard A. (2006): Ecological marginalization and hill tribe security in northern Thailand. The Geographical Bulletin 48(1), p. 15-40.
Csillag, Ron (2012): Water won't cause Mideast war, Israeli prof says. The Canadian Jewish News, 13/09/2012.
Cullet, Philippe/Paranjape, Suhas/Thakkar, Himanshu/Vani, M.S./Joy, K.J./Ramesh, M.K. (2012): Water conflicts in India: towards a new legal and institutional framework. Pune: FPDWCI.
Dalby, Simon/Brauch, Hans Günter/Spring, Úrsula Oswald (2009): Environmental security concepts revisited during the first three phases (1983-2006). In: Brauch, Hans Günter/Spring, Úrsula Oswald/Grin, John/Mesjasz, Czeslaw/Kameri-Mbote, Patricia/Behera, Navnita Chadha/Chourou, Béchir/Krummenacher, Heinz (eds.): *Facing global environmental change: environmental, human, energy, food, health and water security concepts*. Berlin/Heidelberg: Springer, p. 781-790.
Daoudi, Mohammed Dajani (2009): Conceptualization and debate on environmental and human security in Palestine. In: Brauch, Hans Günter/Oswald Spring, Úrsula/Grin, John/Mesjasz, Czeslaw/Kameri-Mbote, Patricia/Chadha Behera, Navnita/Courou, Béchir/Krummenacher, Heinz (eds.): *Facing global environmental change: environment, human, energy, food, health and water security concepts*. Berlin/Heidelberg: Springer, p. 873-883.
Day, Joel/Pinckney, Jonathan/Chenoweth, Erica (2014): Collecting data on nonviolent action: lessons learned and ways forward. Journal of Peace Research 51, forthcoming.
de Almeida, Lúcio Flávio/Sánchez, Félix Ruiz (2000): The landless workers' movement and social struggle against neoliberalism. Latin American Perspectives 27(5), p. 11-32.
de Châtel, Francesca (2007): Perceptions of water in the Middle East. In: Shuval, Hillel/Dweik, Hassan (eds.): *Water resources in the Middle East: Israeli-Palestinian water issues - from conflict to cooperation*. Berlin/Heidelberg: Springer, p. 53-60.
de Châtel, Francesca (2014): The role of drought and climate change in the Syrian uprising: untangling the triggers of the revolution. Middle Eastern Studies 50(4), p. 521-535.
de Juan, Alexander (2012): Mapping political violence: the approaches and conceptual challenges of subnational geospatial analyses of intrastate conflict. Hamburg: GIGA.
de Martino, Luigi/Carlsson, Annica/Rampolla, Gioanluca/Kadyrzhanova, Inkar/Svedberg, Peter/Denisov, Nickolai/Novikov, Viktor/Rekacewitcz, Philippe/Simonett, Otto/Skalvik, Janet Fernandez/del Pietro, Dominique/Rizollio, Diana/Palosaari, Marika (2005): Transforming risks into cooperation: central Asia, Ferghana/Osh/Khujand area. Geneva: ENVSEC.

de Meur, Gisèle/Rihoux, Benoît/Yamasaki, Sakura (2009): Addressing the critiques of QCA. In: Rihoux, Benoît/Ragin, Charles C. (eds.): *Configurational comparative methods: Qualitative Comparative Analysis (QCA) and related techniques*. Thousand Oaks: Sage, p. 147-165.

de Sherbinin, Alex (2014): Climate change hotspots mapping: what have we learned? Climatic Change 123(1), p. 23-37.

Degen, Peter/van Acker, Frank/van Zalinge, Niek/Thuok, Nao/Vuthy, Ly (2000): Taken for granted: conflicts over Cambodia's freshwater fish resources. Presented at the 8th IASCP conference, Bloomington, 31/05-04/06/2000.

Deligiannis, Tom (2012): The evolution of environment-conflict research: toward a livelihood framework. Global Environmental Politics 12(1), p. 78-100.

Derman, Bill/Odgaard, Rie/Sjaastad, Espen (eds.) (2007): *Conflicts over land & water in Africa*. Oxford: James Currey.

Detges, Adrien (2014): Close-up on renewable resources and armed conflict: the spatial logic of pastoralist violence in northern Kenya. Political Geography 42(1), p. 57-65.

Detraz, Nicole/Betsill, Michele M. (2009): Climate change and environmental security: for whom the discourse shifts. International Studies Perspectives 10(3), p. 303-320.

Deudney, Daniel (1990): The case against linking environmental degradation and national security. Millennium 19(3), p. 461-476.

Devitt, Conor/Tol, Richard (2012): Civil war, climate change, and development: a scenario study for Sub-Saharan Africa Journal of Peace Research 49(1), p. 129-145.

DHS Program (2013): Demographic and health surveys. http://www.dhsprogram.com/Publications/Publications-by-Country.cfm (21/03/2014).

Dietz, Kristina/Engels, Bettina (2014): Immer (mehr) Ärger wegen der Natur? - Für eine gesellschafts- und konflikttheoretische Analyse von Konflikten um Natur. Österreichische Zeitschrift für Politikwissenschaft 43(1), p. 73-90.

Diez, Thomas/Stetter, Stephan/Albert, Mathias (2006): The European Union and border conflicts: the transformative power of integration. International Organization 60(3), p. 563-593.

Dixon, Jeffrey (2009): What causes civil war? Integrating quantitative research findings. International Studies Review 11(4), p. 707-735.

Dombrowsky, Ines (1998): The Jordan river basin: prospects for cooperation within the Middle East peace process? In: Scheumann, Waltina/Schiffler, Manuel (eds.): *Water in the Middle East: potencials for conflicts and prospects for cooperation*. Berlin: Springer, p. 91-112.

Drury, A. Cooper/Olson, Richard Stuart (1998): Disasters and political unrest: an empirical investigation. Journal of Contingencies and Crisis Management 6(3), p. 153-161.

Dubiel, Helmut (1999): Integration durch Konflikt? In: Friedrichs, Jürgen/Jagodzinski, Wolfgang (eds.): *Soziale Integration*. Opladen: Westdeutscher Verlag, p. 132-143.

Duffy, Rosaleen (2002): Peace parks: the paradox of globalisation? Geopolitics 6(2), p. 1-26.

Dunn, Elizabeth Cullen/Bobick, Michael S. (2014): The empire strikes back: war without war and occupation without occupation in the Russian sphere of influence. American Ethnologist 41(3), p. 405-413.

Dunn, Kevin C. (2001): Identity, space and the political economy of conflict in Central Africa. Geopolitics 6(2), p. 51-78.

Durkheim, Emile (1979): *Suicide: a study in sociology*. New York: Free Press.

Eaton, David (2008): The business of peace: raiding and peace work along the Kenya–Uganda border (part I). African Affairs 107(426), p. 89-110.

Eaton, David (2010): The rise of the 'traider': the commercialization of raiding in Karamoja. Nomadic Peoples 14(2), p. 106-122.

Elwood, Sarah/Goodchild, Michael F./Sui, Daniel Z. (2012): Researching volunteered geographic information: spatial data, geographic research, and new social practice. Annals of the Association of American Geographers 102(3), p. 571-590.

Ember, Carol C./Adem, Teferi Abate/Skoggard, Ian/Jones, Eric C. (2012): Livestock raiding and rainfall variability in northern Kenya. Civil Wars 14(2), p. 159-181.

Engels, Annita (2008): Local environmental changes and global sea-level rise: the case of coastal zones in Senegal. In: Casimir, Michael J. (ed.): *Culture and the changing environment: uncertainty, cognition and risk management in a cross-cultural perspective*. Oxford/New York: Berghahn, p. 175-195.

Engels, Bettina (2014): Contentious politics of scale: the global food price crisis and local protest in Burkina Faso. Social Movement Studies 13(4).

Engels, Bettina/Chojnacki, Sven (2012): Raus aus der Klimafalle: Wie die Friedens- und Konfliktforschung mit ökologischem Wandel umgehen kann. Friedens-Warte 87(1), p. 89-110.

Englehart, Neil A. (2008): Resource conflict and ethnic peace in northern Thailand. Asia Pacific Viewpoint 49(1), p. 98-110.

Epler, Bruce (2007): *Tourism, the economy, population growth, and conservation in Galapagos*. Puerto Ayora: Charles Darwin Foundation.

Eriksen, Siri/Lind, Jeremy (2006): The impacts of conflict on household coping strategies: evidence from Turkana and Kitui districts in Kenya. Die Erde 137(3), p. 249-270.

Eriksen, Siri/Lind, Jeremy (2009): Adaptation as a political process: adjusting to drought and conflict in Kenya's drylands. Environmental Management 43(5), p. 817-835.

Eriksen, Thomas Hyland (2001): Ethnic identity, national identity, and intergroup conflict: the significance of personal experiences. In: Ashmore, Richard/Wilder, David/Jussim, Lee (eds.): *Social identity, intergroup conflict, and conflict reduction*. Oxford: Oxford University Press, p. 42-68.

Escalante-Rengifo, Guadalupe (2014): Newspaper's production of Latin American identity: a discursive analysis in three waves of immigration in Quebec (1973-2011) Presented at the Tenth International Congress of Qualitative Inquiry, Urbana-Champaign, 21-24/05/2014.

Esty, Daniel/Goldstone, Jack/Gurr, Ted Robert/Harff, Barbara/Levy, Marc/Dabelko, Geoffrey/Surko, Pamela/Unge, Allan (1999): State failure task force report: phase II findings. Environmental Change and Security Project Report 5(1), p. 49-72.

Evans, Brad (2010): Foucault's legacy: security, war and violence in the 21st century. Security Dialogue 41(4), p. 413-433.

Fairhead, James/Leach, Melissa/Scoones, Ian (2012): Green grabbing: a new appropriation of nature? Journal of Peasant Studies 39(2), p. 237-261.

FAO (2013): FAOSTAT, population, annual population. http://faostat3.fao.org/home/index.html#DOWNLOAD (18/04/2013).

Faris, Stephen (2007): The real roots of Darfur. The Atlantic Monthly 2007(April), p. 2.

Farnum, Rebecca (2014): Virtual allocations: expanding the framework of hydro-hegemony to inform virtual water trade. Presented at the Norwich Conference on Earth System Governance, Norwich, 01-03/07/2014.

Fasona, Mayowa/Omojola, Ademola (2005): Climate change, human security and communal clashes in Nigeria. Presented at the Human Security and Climate Change International Workshop, Oslo, 21-23/06/2005.

Fearnside, Philip M. (2001): Land-tenure issues as factors in environmental destruction in Brazilian Amazonia: the case of southern Pará. World Development 29(8), p. 1361-1372.

Fearon, James D. (2010): Governance and civil war onset, WDR 2011 background paper. Washington DC: World Bank.

Fearon, James D./Laitin, David D. (2003): Ethnicity, insurgency, and civil war. American Political Science Review 97(1), p. 75-90.

Fedeski, Michael/Gwilliam, Julie (2007): Urban sustainability in the presence of flood and geological hazards: the development of a GIS-based vulnerability and risk assessment methodology. Landscape and Urban Planning 83(1), p. 50-61.

Feil, Moira/Klein, Diana/Westerkamp, Meike (2009): Regional cooperation on environment, economy and natural resource management: how can it contribute to peacebuilding? Brussels: Initiative for Peacebuilding.
Feitelson, Eran (2002): Implications of shifts in the Israeli water discourse for Israeli-Palestinian water negotiations. Political Geography 21(3), p. 293-318.
Feitelson, Eran (2013): The four eras of Israeli water policies. In: Becker, Nir (ed.): *Water policy in Israel: context, issues and options*. Berlin: Springer, p. 15-32.
Feitelson, Eran/Rosenthal, Gad (2012): Desalination, space and power: the ramifications of Israel's changing water geography. Geoforum 43(1), p. 272-284.
Feitelson, Eran/Tamimi, Abdelrahman/Rosenthal, Gad (2012): Climate change and security in the Israeli-Palestinian context. Journal of Peace Research 49(1), p. 241-257.
FEWS NET (2005): Conflict baseline study report: conducted in the Karamajong cluster of Kenya and Uganda. Kampala: USAID.
Fischhendler, Itay/Dinar, Shlomi/Katz, David (2011): The politics of unilateral environmentalism: conflict over water-management along the Israeli-Palestinian border. Global Environmental Politics 11(1), p. 36-61.
Fjelde, Hanne/von Uexkull, Nina (2012): Climate triggers: rainfall anomalies, vulnerability and communal conflict in Sub-Saharan Africa. Political Geography 31(7), p. 444-453.
Flyvbjerg, Bent (2006): Five misunderstanding about case-study research. Qualitative Inquiry 12(2), p. 219-245.
FoEME (2007): Good Water Neighbours: identifying common environmental problems and shared solutions. Amman/Bethlehem/Tel Aviv: FoEME.
FoEME (2012): Community based problem solving on water issues: cross-border "priority initiatives" of the Good Water Neighbours project. Amman/Bethlehem/Tel Aviv: FoEME.
Fotheringham, Stewart/Rogerson, Peter (2002): *Spatial analysis and GIS*. London: Taylor & Francis.
Frehse, Lea (2013): Wall threatening Battir: contending with the green. http://www.alternativenews.org/english/index.php/features/up-close/6362-wall-threatening-battir-contending-with-the-green-.html (16/01/2014).
Fritz, Charles E. (1996): Disasters and mental health: therapeutic principles drawn from disaster studies. Newark: Disaster Research Center.
Fröhlich, Christiane (2010): *Der israelisch-palästinensische Wasserkonflikt: diskursanalytische Betrachtungen*. Wiesbaden: VS-Verlag.
Fröhlich, Christiane (2012): Security and discourse: the Israeli-Palestinian water conflict. Conflict, Security & Development 12(2), p. 123-148.
Funder, Mikkel/Bustamante, Rocío/Cossio, Vladimir/Huong, Pham Thi Mai/van Koppen, Barbara/Mweemba, Carol/Nyambe, Imasiku/Phuong, Le Thi Thanh/Skielboe, Thomas (2012): Strategies of the poorest in local water conflict and cooperation: evidence from Vietnam, Bolivia and Zambia. Water Alternatives 5(1), p. 20-36.
Funder, Mikkel/Mweemba, Carol (2010): The case of the Mbeza irrigation scheme, Namwala, Zambia. Conflict and cooperation in local water governance case study report 12. Copenhagen: DIIS.
Funder, Mikkel/Mweemba, Carol/Nyambe, Imasiku/van Koppen, Barbara/Ravnborg, Helle Munk (2010): Understanding local water conflict and cooperation: the case of Namwala district, Zambia. Physics and Chemistry of the Earth 35(13-14), p. 758-764.
Gaillard, Jean-Christophe/Clavé, Elsa/Kelman, Ilan (2008): Wave of peace? Tsunami disaster policy in Aceh, Indonesia. Geoforum 39(1), p. 511-526.
Gatter, Peer (2012): *Politics of qat: the role of a drug in ruling Yemen*. Wiesbaden: Ludwig Reichert Verlag.
Gemenne, Francois/Barnett, Jon/Adger, W. Neil/Dabelko, Geoffrey (2014): Climate and security: evidence, emerging risks, and a new agenda. Climatic Change 123(1), p. 1-9.

George, Alexander L./Bennett, Andrew (2005): *Case studies and theory development in the social sciences*. Cambridge: MIT Press.

Gerring, John (2007): *Case study research: principles and practices*. New York: Cambridge University Press.

Gerring, John (2008): Case selection for case-study analysis: qualitative and quantitative techniques. In: Box-Steffensmeier, Janet M./Brady, Henry E./Collier, David (eds.): *The Oxford Handbook of political methodology*. New York: Oxford University Press, p. 645-684.

Gerring, John (2012): *Social science methodology: a unified framework*. Cambridge: Cambridge University Press.

Gerring, John/Seawright, Jason (2007): Techniques for choosing cases. In: Gerring, John (ed.): *Case study research: principles and practices*. New York: Cambridge University Press, p. 86-150.

Giddens, Anthony (1986): *The constitution of society: outline of the theory of structuration*. Cambridge: Polity Press.

Giese, Ernst/Sehring, Jenniver (2006): Regionalexpertise - Destabiliserungs- und Konfliktpotential prognostizierter Umweltveränderungen in der Region Zentralasien bis 2020/2050. Berlin: WBGU.

Gillet, Simon (2001): Tribesmen, politics, opium and development in Dir, Pakistan. Asian Affairs 32(3), p. 268-278.

Gilpin, Robert (1987): The theory of hegemonic war. Journal of Interdisciplinary History 18(4), p. 591-613.

Gioli, Giovanna/Khan, Talimand/Scheffran, Jürgen (2013): Remittances and community resilience to conflict and environmental hazards in northwestern Pakistan. In: Rodima-Taylor, Daivi (ed.): *Remittance flows to post-conflict states: perspectives on human security and development*. Boston: Pardee House, p. 117-126.

Gizelis, Theodora-Ismene/Wooden, Amanda E. (2010): Water resources, institutions, & intrastate conflict. Political Geography 29(8), p. 444-453.

Glaser, Barney G./Strauss, Anselm L. (1967): *The discovery of grounded theory: strategies for qualitative research*. New York: Aldine de Gruyter.

Glasze, Georg/Mattissek, Annika (2009): Diskursforschung in der Humangeographie: konzeptionelle Grundlagen und empirische Operationalisierungen. In: Glasze, Georg/Mattissek, Annika (eds.): *Handbuch Diskurs und Raum: Theorien und Methoden für die Humangeographie sowie die sozial- und kulturwissenschaftliche Raumforschung*. Bielefeld: transcript, p. 11-60.

Gleditsch, Kristian Skrede/Weidmann, Nils B. (2012): Richardson in the information age: Geographical Information Systems and spatial data in international studies. Annual Review of Political Science 15(1), p. 461-481.

Gleditsch, Nils Petter (2003): Environmental conflict: neomalthusians vs. cornucopians. In: Brauch, Hans Günter/Liotta, Peter H./Marquina, Antonio/Rogers, Paul F./El-Sayed Selim, Mohammed (eds.): *Security and environment in the Mediterranean: conceptualising security and environmental conflicts*. Berlin/Heidelberg: Springer, p. 477-485.

Gleditsch, Nils Petter (2012): Whither the weather? Climate change and conflict. Journal of Peace Research 49(1), p. 3-9.

Gleditsch, Nils Petter/Nordås, Ragnhild (2014): Conflicting messages? The IPCC on conflict and human security. Political Geography 43(1).

Gleditsch, Nils Petter/Urdal, Henrik (2002): Ecoviolence? Links between population growth, environmental scarcity and violent conflict in Thomas Homer-Dixon's work. Journal of International Affairs 56(1), p. 283-302.

Gleditsch, Nils Petter/Wallensteen, Peter/Eriksson, Mikael/Sollenberg, Margareta/Strand, Håvard (2002): Armed conflict 1946-2001: a new dataset. Journal of Peace Research 39(5), p. 615-637.

Gleick, Peter (1993): Water and conflict: fresh water resources and international security. International Security 18 (1), p. 79-112.

Gleick, Peter (2014): Water, drought, climate change, and conflict in Syria. Weather, Climate, and Society 6(3), p. 331-340.
Goldstein, Joshua S. (1992): A conflict-cooperation scale for WEIS events data. Journal of Peace Research 36(2), p. 369-385.
Gomez, Ligia/Ravnborg, Helle Munk (2011): Power, inequality, and water governance: the role of third party involvement in water-related conflict and cooperation. Washington D.C.: IFPRI.
Government of Kenya (2007): National policy for the development of arid and semi arid lands. Nairobi: Office of the Prime Minister.
Government of Kenya (2009): Loitoktok district development plan 2009. Nairobi: Office of the Prime Minister.
Gray, Alice/Hilal, Jane (2007): Water and security in Palestine. In: Lipchin, Clive/Pallant, Eric/Saranga, Danielle/Amster, Allyson (eds.): *Integrated water resources management and security in the Middle East*. Dordrecht: Springer, p. 99-117.
Green, Arthur (2010): Social identity, natural resources, and peacebuilding. Presented at the CAPRi Workshop on Collective Action, Property Rights, and Conflict in Natural Resources Management, Siem Reap, 28/06-01/07/2010.
Green, Arthur (2015): Social identity, natural resources, and peacebuilding. In: Young, Helen/Goldman, Lisa (eds.): *Livelihoods, natural resources and post-conflict peacebuilding.* London: Routledge, p. 60-79.
Guillaume, Xavier (2002): Foreign policy and the politics of alterity: a dialogical understanding of international relations. Millenium 31(1), p. 1-26.
Haas, Ernst B. (1970): The study of regional integration: reflections on the joy and anguish of pretheorizing. International Organization 24(4), p. 607-646.
Hagmann, Tobias (2009): Fighting in the desert? Conflict and resource management in East African drylands. In: Péclard, Didier (ed.): *Environmental peacebuilding: managing natural resource conflicts in a changing world*. Bern: swisspeace, p. 22-27.
Hagmann, Tobias/Mulugeta, Alemmaya (2008): Pastoral conflict and state-building in the Ethiopian lowland. African Spectrum 43(1), p. 19-39.
Hajer, Maarten A. (1995): *The politics of environmental discourse: ecological modernization and the policy process*. Oxford: Oxford University Press.
Hajer, Maarten/Versteeg, Wytske (2005): A decade of discourse analysis of environmental politics: achievements, challenges, perspectives. Journal of Environmental Policy & Planning 7(3), p. 175-184.
Hakim, Stepi/Hasantoha, Adnan/Indriatmoko, Yayan/Iwan, Ramses/Kusumanto, Trikurnianti /Limberg, Godwin/Moeliono, Moira/Sudana, Made/Wollenberg, Eva/Yuliani, Linda/Colfer, Carol J. Pierce (2005): Case 7: Indonesia. In: Colfer, Carol J. Pierce (ed.): *The complex forest: communities, uncertainty & adaptive collaborative management*. Washington DC: RFF Press, p. 257-271.
Hales, Gavin (2010): Under pressure: social violence over land and water in Yemen. Geneva: SAV.
Haller, Tobias (2013): *The contested floodplain: institutional change and the commons in the Kafue Flats, Zambia*. Plymouth: Lexington Books.
Hammond, John L. (2009): Land occupations, violence, and the politics of agrarian reform in Brazil. Latin American Perspectives 36(4), p. 156-177.
Hannigan, John (2006): *Environmental sociology*. New York: Routledge.
Hansen, Lene (2006): *Security as a practice: discourse analysis and the Bosnian war*. London: Routledge.
Harari, Nicole/Roseman, Jesse (2008): Environmental peacebuilding, theory and practice: a case study of the Good Water Neighbours project and in depth analysis of the Wadi Fukin/Tzur Hadassah communities. Amman/Bethlehem/Tel Aviv: FoEME.
Hares, Minna (2009): Forest conflict in Thailand: northern minorities in focus. Environmental Management 43(3), p. 981-395.

Hartmann, Betsy (2010): Rethinking climate refugees and climate conflict: rhetoric, reality and the politics of policy discourse. Journal of International Development 22(2), p. 233-246.
Hauge, Wenche/Ellingsen, Tanja (1998): Beyond environmental scarcity: causal pathways to conflict. Journal of Peace Research 35(3), p. 299-317.
Haviv, Itay (2013): Personal communication (03/06/2013).
Hedström, Peter (2005): *Dissecting the social: on the principles of analytical sociology*. Cambridge: Cambridge University Press.
Hegre, Håvard/Sambanis, Nicholas (2006): Sensitivity analysis of empirical results on civil war onset. Journal of Conflict Resolution 50(4), p. 508-535.
Heinen, Joel T. (1993): Park-people relations in Koshi Tappu Wildlife Reserve, Nepal: a socio-economic analysis. Environmental Conservation 20(1), p. 25-34.
Hendrickson, Dylan/Mearns, Robin/Armon, Jeremy (1996): Livestock raiding among the pastoral Turkana of Kenya: redistribution, predation and the link to famine. IDS Bulletin 27(3), p. 17-30.
Hendrix, Cullen S./Glaser, Sarah M. (2007): Trends and triggers: Climate, climate change and civil conflict in Sub-Saharan Africa. Political Geography 26(6), p. 695-715.
Hendrix, Cullen S./Salehyan, Idean (2012): Climate change, rainfall, and social conflict in Africa. Journal of Peace Research 49(1), p. 35-50.
Heylings, Pippa/Cruz, Felipe (1998): Common property, conflict and participatory management in the Galapagos Islands. Presented at the 8th Annual Conference on Common Property, Burnaby, 06/1998.
Hislope, Robert (2007): From expressive to actionable hatred: ethnic divisions and riots in Macedonia. In: Jenkins, Craig/Gottlieb, Esther (eds.): *Identity conflicts: can violence be regulated?* New Brunswick/London: Transaction Publishers, p. 149-165.
Homer-Dixon, Thomas (1991): On the threshold: environmental changes as causes of acute conflict. International Security 16(2), p. 76–116.
Homer-Dixon, Thomas (1994): Environmental scarcities and violent conflict - evidence from cases. International Security 19(1), p. 5-40.
Homer-Dixon, Thomas (1995): The ingenuity gap: can poor countries adapt to resource scarcity? Population and Development Review 21(3), p. 587-612.
Homer-Dixon, Thomas (1999): *Environmental scarcity and violence*. Princeton: Princeton University Press.
Homer-Dixon, Thomas/Blitt, Jessica (1998a): Introduction: a theoretical overview. In: Homer-Dixon, Thomas/Blitt, Jessica (eds.): *Ecoviolence: links among environment, population, and security*. Lanham: Rowman & Littlefield, p. 1-17.
Homer-Dixon, Thomas/Blitt, Jessica (1998b): Key findings. In: Homer-Dixon, Thomas/Blitt, Jessica (eds.): *Ecolviolence: links among environment, population, and security*. Lanham: Rowman & Littlefield, p. 223-228.
Homer-Dixon, Thomas/Blitt, Jessica (eds.) (1998c): *Ecoviolence: links among environment, population, and security*. Lanham: Rowman & Littlefield.
Horowitz, Leah S. (2009): Environmental violence and crises of legitimacy in New Caledonia. Political Geography 28(4), p. 248-258.
Houdret, Annabelle (2010): *Wasserkonflikte sind Machtkonflikte: Ursachen und Lösungsansätze in Marokko*. Wiesbaden: VS-Verlag.
Houdret, Annabelle/Bonnet, Simon (2013): Public-private partnerships in irrigation management: socioeconomic, political and environmental concerns. Presented at the ECPR General Conference, Bordeaux, 04-07/09/2013.
Houdret, Annebelle (2012): The water connection: irrigation, water grabbing and politics in southern Marocco. Water Alternatives 5(2), p. 284-303.
Hsiang, Solomon/Burke, Marshall (2014): Climate, conflict, and social stability: what does the evidence say? Climatic Change 123(1), p. 39-55.

Hsiang, Solomon/Burke, Marshall/Miguel, Edward (2013): Quantifying the influence of climate on human conflict. Science 341(6151), p. 1-14.
Hsiang, Solomon M./Meng, Kyle C. (2013): Reconciling disagreement over climate–conflict results in Africa. PNAS 110(p. 1-4.
Hsiang, Solomon M./Meng, Kyle C./Cane, Mark A. (2011): Civil Conflicts are Associated with the Global Climate. Nature 476(7361), p. 438-441.
Hug, Simon (2013): Qualitative Comparative Analysis: how inductive use and measurement error lead to problematic inferences. Political Analysis 21(2), p. 252-265.
Hulme, Mike/Doherty, Ruth/Ngara, Todd/New, Mark/Lister, David (2001): African climate change: 1900-2100. Climate Research 17(2), p. 145-168.
Inselman, Ashley D. (2004): Environmental degradation and conflict in Karamoja, Uganda: the decline of a pastoral society. International Journal of Global Environmental Issues 3(2), p. 168-187.
IPCC (2001): TAR, working group I: the scientific basis, appendix I - glossary. http://www.ipcc.ch/ipccreports/tar/wg1/518.htm (24/07/2014).
IPCC (2007): Climate change 2007: synthesis report. Geneva: IPCC.
IPCC (2012): Managing the risks of extreme events and disasters to advance climate change adaptation. New York: Cambridge University Press.
IPCC (2013): *Climate change 2013: the physical science basis*. Cambridge: Cambridge University Press.
IPCC (2014): Climate change 2014: impacts, adaptation, and vulnerability. Geneva: IPCC.
Isaac, Jad/Shuval, Hillel (eds.) (1994): *Water and peace in the Middle East*. Amsterdam: Elsevier.
ISRIC (1990): Global assessment of human-induced soil degradation (GLASOD). http://www.isric.org/projects/global-assessment-human-induced-soil-degradation-glasod (20/04/2012).
IWA (2009): The issue of water between Israel and Palestine. Tel Aviv: IWA.
IWMI (2006): Insights from the comprehensive assessment of water management in agriculture. Colombo: IWMI.
Jabri, Vivienne (1996): *Discourses on violence: conflict analysis reconsidered*. Manchester: Manchester University Press.
Jabs, Lorelle (2007): Where two elephants meet, the grass suffers: a case study of intractable conflict in Karamoja, Uganda. American Behavioral Scientist 50(11), p. 1498-1519.
Jäger, Siegfried (2004): *Kritische Diskursanalyse: eine Einführung*. Münster: Unrast-Verlag.
Jamerson, Ken/Wiessner, Polly (2008): Violent and non-violent response to state failure: Papua New Guinea and Ecuador. In: Karawan, Ibrahim/McCormack, Wayne/Reynolds, Stephen (eds.): *Values and violence: intagible aspects of terrorism*. New York: Springer, p. 189-204.
Jarvie, James/Malley, Michael/Manembu, Niesja/Raharjo, Diah/Roule, Trifin (2003): Indonesia. In: Jarvie, James/Kanaan, Ramzy/Malley, Michael/Roule, Trifin/Thomason, Jamie (eds.): *Conflict timber: dimensions of the problem in Asia and Africa*. Burlington: ARD, p. 6-105.
Jewitt, Sarah (2008): Political ecology of Jharkhand conflicts. Asia Pacific Viewpoint 49(1), p. 68-82.
Johnstone, Sarah/Mazo, Jeffrey (2011): Global warming and the Arab Spring. Survival: Global Politics and Strategy 53(2), p. 11-17.
Kahl, Colin H. (2006): *States, scarcity, and civil strife in the developing world*. Princeton: Princeton University Press.
Kamara, Abdul B./Swallow, Brent/Krik, Michael (2004): Policies, interventions and institutional change in pastoral resource management in Borana, southern Ethiopia. Development Policy review 22(4), p. 381-403.
Kaplan, Robert D. (1994): The coming anarchy. Atlantic Monthly 1994(2), p. 1-28.
Karki, Sameer/Upreti, Bishnu Raj/Robinson, Julia/Bellbase, Narayan (2006): Koshi Tappu, Nepal. In: Moore, Patricia (ed.): *Resource rights, sustainable livelihoods, environmental security and conflict mitigation in South Asia*. Bangkok: IUCN, p. 95-128.

Kaufman, Stuart (2001): *Modern hatreds: the symbolic politics of ethnic war*. Ithaca/London: Cornell University Press.
Kaufman, Stuart (2006): Symbolic politics or rational choice? Testing theories of extreme ethnic violence. International Security 30(4), p. 45-86.
Kaufman, Stuart (2009): Narratives and symbols in violent mobilization: the Palestinian-Israeli case. Security Studies 18(3), p. 400-434.
Keller, Reiner (2011a): The sociology of knowledge approach to discourse (SKAD). Human Studies 34(1), p. 43-65.
Keller, Reiner (2011b): *Wissenssoziologische Diskursanalyse: Grundlegung eines Forschungsprogramms*. Wiesbaden: VS-Verlag.
Keller, Reiner (2013): *Doing discourse research: an introduction for social scientists*. London: Sage.
Kelly, Kimberley/Homer-Dixon, Thomas (1998): The case of Gaza. In: Homer-Dixon, Thomas/Blitt, Jessica (eds.): *Ecoviolence: links among environment, population, and security*. Lanham: Rowman & Littlefield, p. 67-107.
Kelman, Ilan (2006): Acting on disaster diplomacy. Journal of International Affairs 59(2), p. 215-240.
Kelman, Ilan (2012): *Disaster diplomacy: how disasters affect peace and conflict*. London: Routledge.
Ker-Lindsay, James (2000): Greek-Turkish reapproachement: the impact of "disaster diplomacy". Cambridge Review of International Affairs 14(1), p. 215-232.
Keskinen, Marko/Käkönen, Mira/Tola, Prom/Varis, Olli (2007): Cambodia: water-related conflicts with abundance of water. The Economics of Peace and Security Journal 2(2), p. 49-59.
Khan, Shaheen Rafi (2003): Environmental security in Pakistan: are their grounds for optimism? In: Najam, Adil (ed.): *Environment, development, and human security: perspectives from south Asia*. Lanham: University Press of America, p. 67-102.
Khan, Shaheen Rafi (2008): Tradition and sovereignty: conflicts over the forests of Dir-Kohistan. Presented at the 23rd Annual General Meeting and Conference of the Pakistan Society of Development Economists, Islamabad, 12-14/03/2008.
Khan, Shaheen Rafi/Bokhari, Shahbaz/Matthew, Richard (2006a): Livelihoods, security and conflict, Dir Kohistan, Pakistan. In: Moore, Patricia (ed.): *Resource rights, sustainable livelihoods, environmental security and conflict mitigation in south Asia*. Bangkok: IUCN, p. 129-159.
Khan, Shaheen Rafi/Yusuf, Moeed/Ahmed, Riaz (2006b): Anatomy of a peoples' rights movement: a case study of the Sarhad Awami Forestry Ittehad (SAFI). Islamabad: SDPI.
Kiernan, Ben (2002): Conflict in Cambodia, 1945-2002. Critical Asian Studies 34(4), p. 483-495.
King, Gary/Keohane, Robert O./Verba, Sydney (1994): *Designing social inquiry : scientific inference in qualitative research* Princeton: Princeton University Press.
KOD (2009): Population, 3 years and above by sex and school attendance status county estimates. https://opendata.go.ke/Counties/2009-Census-Vol-II-Table-1-Population-3-years-and-/jkkd-epmw (11/04/2013).
Korf, Benedikt (2006): Who is the rogue? Discourse, power and spatial politics in post-war Sri Lanka. Political Geography 25(3), p. 279-297.
Koubi, Vally/Bernauer, Thomas/Kalbhenn, Anna/Spilker, Gabriele (2012): Climate variability, economic growth, and civil conflict. Journal of Peace Research 49(1), p. 113-127.
Koubi, Vally/Spilker, Gabriele/Böhmelt, Tobias/Bernauer, Thomas (2014): Do natural resources matter for interstate or intrastate armed conflict? Journal of Peace Research 51(2), p. 227-243.
Kramer, Annika (2008): Regional water cooperation and peacebuilding in the Middle East. Berlin: Adelphi Research.
Landis, Steven T., 2014: Temperature seasonality and violent conflict: the inconsistencies of a warming planet. Journal of Peace Research 51(5), p. 603-618.

Lam, Lai Ming (2004): A study of stated attitudes and behaviour of local people toward conservation in Koshi Tappu Wildlife Reserve, Nepal. Presented at the 5th Biennial Conference of the Asian Studies Association of Australia, Canberra, 29/06-02/07/2004.
Lautze, Jonathan/Kirshen, Paul (2009): Water allocation, climate change, and sustainable water use in Israel/Palestine: the Palestinian position. Water International 34(2), p. 189-203.
Lautze, Jonathan/Reeves, Meredith/Vega, Rosaura/Kirshen, Paul (2005): Water allocation, climate change, and sustainable Peace: the Israeli proposal. Water International 30(2), p. 197-209.
Le Billon, Philippe (2001): The political ecology of war: natural resources and armed conflicts. Political Geography 20(5), p. 561-584.
Le Billon, Philippe/Waizenegger, Arno (2007): Peace in the wake of disaster? Secessionist conflicts and the 2004 Indian ocean tsunami. Transactions of the Institute of British Geographers 32(2), p. 411-427.
Leetaru, Kalev/Schrodt, Philip A. (2013): GDELT: Global data on events, location and tone, 1979-2012. Presented at the 54th ISA Annual Convention, San Francisco, 03/04/-06/04/2013.
Lejano, Raul (2006): Theorizing peace parks: two models of collective action. Journal of Peace Research 43(5), p. 563-581.
Levy, Marc (1995): Is the environment a national security issue? International Security 20(2), p. 35-62.
Lichenthäler, Gerd/Turton, Anthony R. (1999): Water demand management, natural resource reconstruction and traditional value systems: a case study from Yemen. London: SOAS.
Limbu, Kul Prasad/Karki, Toran Bahadur (2003): Park-people conflict in Koshi Tappu Wildlife Reserve. Our Nature 1(1), p. 15-18.
Lind, Jeremy/Sturman, Kathryn (eds.) (2002): *Scarcity and surfeit: the ecology of Africa's conflicts*. Pretoria: ISS.
Lipchin, Clive (2007): Water, agriculture and zionsim: exploring the interface between policy and ideology. In: Lipchin, Clive/Pallant, Eric/Saranga, Danielle/Amster, Allyson (eds.): *Integrated water resources management and security in the Middle East*. Dordrecht: Springer, p. 251-268.
Lohmann, Larry (1999): Forest cleansing: racial oppression in scientific nature conservation. Sturminster Newton: Corner House.
Lomborg, Bjørn (2001): *The sceptical environmentalist: Measuring the real state of the world*. Cambridge: Cambridge University Press.
Lynch, Barbara Deutsch (2012): Vulnerabilities, competition and rights in a context of climate change toward equitable water governance in Peru's Rio Santa Valley. Global Environmental Change 22(2), p. 364-373.
Macdonald, Theodore Jr. (1997): Conflict in the Galápagos Islands: analysis and recommendations for management. Cambridge: Harvard University.
MacKinnon, Danny (2010): Reconstructing scale: towards a new scalar politics. Progress in Human Geography 35(1), p. 21-36.
Maganga, Faustin/Odgaard, Rie/Sjaastad, Espen (2007): Contested identities & resource conflicts in Morogoro region, Tanzania: who is indigenous? In: Derman, Bill/Odgaard, Rie/Sjaastad, Espen (eds.): *Conflicts over land & water in Africa*. Oxford: James Currey, p. 202-214.
Mahoney, James (2010): After KVV: the new methodology of qualitative research. World Politics 62(1), p. 120-147.
Mahoney, James/Goertz, Gary (2006): A tale of two cultures: contrasting quantitative and qualitative research. Political Analysis 14(3), p. 227-249.
Malley, Zacharia J.U./Taeb, Mohammad/Matsumoto, Tetsuo/Takeya, Hiroyuki (2008): Linking perceived land and water resources degradation, scarcity and livelihood conflicts in

southwestern Tanzania: implications for sustainable rural livelihood. Environment, Development and Sustainability 10(3), p. 349-372.
Malthus, Thomas (1992): *An essay on the principle of population, or a view of its past and present effects on human happiness*. Cambridge: Cambridge University Press.
Marshall, Monty G./Jaggers, Keith/Gurr, Ted Robert (2012): Polity IV annual time-series, 1800-2011. http://www.systemicpeace.org/inscr/inscr.htm (16/04/2013).
Martin, Adrian (2005): Environmental conflict between refugee and host communities. Journal of Peace Research 42(3), p. 329-346.
Martin, Deborah G./Miller, Byron (2003): Space and contentious politics. Mobilization 8(2), p. 143-156.
Marx, Axel/Dusa, Adrian (2011): Crisp-set Qualitative Comparative Analysis (csQCA), contradictions and consistency benchmarks for model specification Methodological Innovations Online 6(2), p. 103-148.
Mason, Michael (2013): Climate change, securitisation and the Israeli-Palestinian conflict. The Geographic Journal 179(4), p. 298-308.
Mason, Simon/Hagmann, Tobias/Bichsel, Christine/Ludi, Eva/Arsano, Yacob (2009): Linkages between sub-national and international water conflicts: the eastern Nile basin. In: Brauch, Hans Günter/Oswald Spring, Ursula/Grin, John/Mesjasz, Czeslaw/Kameri-Mbote, Patricia/Behera, Navnita Chadha/Chourou, Béchir/Krummenacher, Heinz (eds.): *Facing global environmental change: environment, human, energy, food, health and water security concepts*. Berlin/Heidelberg: Springer, p. 325-334.
Massey, Doreen (1984): Introduction: geography matters. In: Massey, Doreen/Allen, John (eds.): *Geography matters! A reader*. Cambridge: Cambridge University Press, p. 1-11.
Matthew, Richard/Hammill, Anne (2007): Resource rights and conflict in South Asia. Peace Review 19(1), p. 43-49.
Matthew, Richard/Upreti, Bishnu Raj (2005): Environmental stress and demographic change in Nepal: underlying conditions contributing to a decade of insurgency. Environmental Change and Security Project Report 11(1), p. 29-39.
Maystadt, Jean François/Ecker, Olivier (2014): Extreme weather and civil war: does drought fuel conflict in Somalia through livestock price shocks? American Journal of Agricultural Economics 96(4), p. 1157-1182.
McCarthy, John F. (2004): Changing to gray: decentralization and the emergence of volatile socio-legal configurations in central Kalimantan, Indonesia. World Development 32(7), p. 1199-1223.
McDonald, Matt (2013): Discourses of climate security. Political Geography 33(1), p. 42-51.
McKeown, Timothy J. (1999): Case studies and the statistical worldview: review of King, Keohane and Verba's *Designing social inquiry: scientific inference in qualitative research*. International Organization 53(1), p. 161-190.
McLeman, Robert (2013): *Climate and human migration: past experiences, future challenges*. Cambridge: Cambridge University Press.
McMaster, Robert B./Sheppard, Eric (2004): Introduction: scale and geographic inquiry. In: Sheppard, Eric/McMaster, Robert B. (eds.): *Scale and geographic inquiry: nature, society, and method*. Malden: Blackwell, p. 1-22.
Mehta, Lyla (1997): Social difference and water resource management: insights from Kutch, India. IDS Bulletin 28(4), p. 79-89.
Mehta, Lyla (2005): *The politics and poetics of water: the naturalisation of scarcity in western India*. New Dehli: Orient Longman.
Mehta, Lyla (2011): The social construction of scarcity: the case of water in western India. In: Peet, Richard/Robins, Paul/Watts, Michael (eds.): *Global political ecology*. New York: Routledge, p. 371-386.
Meier, Patrick/Bond, Doug/Bond, Joe (2007): Environmental influences on pastoral conflict in the Horn of Africa. Political Geography 26(6), p. 716-735.

Meierding, Emily (2013): Climate change and conflict: avoiding small talk about the weather. International Studies Review 15(2), p. 185-203.
Melander, Erik/Sundberg, Ralph (2011): Climate change, environmental stress, and violent conflict - tests introducing the UCDP georeferenced event dataset. Presented at the 51st ISA Annual Convention, Montreal, 16/03-19/03/2011.
Mena, Tania Paz/Gómez, Ligia/Ravnborg, Helle Munk (2010a): The case of „Las Brumas" community, Condega, Nicaragua. Conflict and cooperation in local water governance case study report 6. Copenhagen: DIIS.
Mena, Tania Paz/Gómez, Ligia/Ravnborg, Helle Munk (2010b): The case of „Los Claveles" community, Condega, Nicaragua. Conflict and cooperation in local water governance case study report 8. Copenhagen: DIIS.
Mena, Tania Paz/Gómez, Ligia/Ravnborg, Helle Munk (2010c): The case of „San Isidro" community, Condega, Nicaragua. Conflict and cooperation in local water governance case study report 7. Copenhagen: DIIS.
Messerschmid, Clemens (2012): Reality and discourses of climate change in the Israel-Palestinian conflict. In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin/Heidelberg: Springer, p. 423-459.
Methmann, Chris/Rothe, Delf (2012): Politics for the day after tomorrow: the logic of apocalypse in global climate politics. Security Dialogue 43(4), p. 323-344.
Miguel, Edward/Satyanath, Shanker/Sergenti, Ernest (2004): Economic shocks and civil conflict: an instrumental variables approach. Journal of Political Economy 112(41), p. 725-753.
Milliken, Jennifer (1999): The study of discourse in international relations: a critique of research and methods. European Journal of International Relations 5(2), p. 225-254.
Mkutu, Kennedy (2006): Small arms and light weapons among pastoral groups in the Kenya-Uganda border area. African Affairs 106(422), p. 47-70.
Moore, Clive (2004): *Happy isles in crisis: the historical causes for a failing state in Solomon Islands, 1998-2004*. Canberra: Asia Pacific Press.
Moore, Dahlia/Guy, Anat (2012): The Israeli–Palestinian conflict: the sociohistorical context and the identities it creates. In: Landis, Dan/Albert, Rosita (eds.): *Handbook of ethnic conflict: international perspectives*. New York: Springer, p. 199-240.
Morozov, Viatcheslav/Rumelili, Bahar (2012): The external constitution of European identity: Russia and Turkey as Europe-makers. Cooperation and Conflict 47(1), p. 28-48.
Mouffe, Chantal (2005): *On the political*. London: Routledge.
Murtinho, Felipe/Tague, Christina/de Bievre, Bert/Eakin, Hallie/Lopez-Carr, David (2013): Water scarcity in the Andes: a comparison of local perceptions and observed climate, land use and socioeconomic changes. Human Ecology 41(5), p. 667-681.
Mwiturubani, Donald Anthony/van Wyk, Jo-Ansie (eds.) (2010): *Climate change and natural resource conflicts in Africa*. Pretoria
Nel, Philip/Righarts, Marjolein (2008): Natural disasters and the risk of violent civil conflict. International Studies Quarterly 52(1), p. 159-185.
Nelson, Travis (2010): When disaster strikes: on the relationship between natural disaster and interstate conflict. Global Change, Peace & Security 22(2), p. 155-174.
Neumann, Iver (1999): *Uses of the other: "the East" in European identity formation*. Manchester: Manchester University Press.
Newman, David (2010): Territory, compartments and borders: avoiding the trap of the territorial trap. Geopolitics 15(4), p. 773-778.
Newman, David/Paasi, Anssi (1998): Fences and neighbours in the postmodern world: boundary narratives in political geography. Progress in Human Geography 22(2), p. 186-207.
Ngaruiya, Grace (2014): Does reactive adaptation exist? Using the ecosystem service governance approach to evaluate post-drought rural food security in Kenya. Natural Resources 5(1), p. 392-407.

Ngaruiya, Grace/Scheffran, Jürgen (2013): Reducing climate adaptation deficits using revolving fund network schemes in rural areas of Kenya: case study of Loitoktok district. Journal of Economic and Sustainable Development 2(4), p. 347-362.

Nicholson, Michael (2000): What's the use of International Relations. Review of International Studies 26(2), p. 183-198.

Nims, Salma (2005): *The dynamics of socio-environmental conflict of land reform in Jordan: a political ecology perspective*. San Domenico de Fiesole: EUI.

Njiru, Beth Njeri (2012): Climate change, resource competition, and conflict amongst pastoral communities in Kenya. In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin/Heidelberg: Springer, p. 513-527.

Nordås, Ragnhild/Gleditsch, Nils Petter (2007): Climate change and conflict. Political Geography 26(6), p. 627-638.

Norman, Emma S. (2012): Cultural politics and transboundary resource governance in the Salish Sea. Water Alternatives 5(1), p. 138-160.

Nuorteva, Paula/Keskinen, Marko/Varis, Olli (2010): Water, livelihoods and climate change adaptation in the Tonle Sap area, Cambodia: learning from the past to understand the future. Journal of Water and Climate Change 1(1), p. 87-101.

Nyong, Anthony (2007): Climate-related conflicts in West Africa. Environmental Change and Security Program Report 12(1), p. 36-42.

Nyong, Anthony/Fiki, Charles/McLeman, Robert (2006): Drought-related conflicts, management and resolution in the West African Sahel: considerations for climate change research. Die Erde 137(3), p. 223-248.

O'Loughlin, John/Holland, Edward C./Witmer, Frank D. W. (2011): The changing geography in Russia's north Caucasus, 1999-2011: regional trends and local dynamics in Dagestan, Ingushetia, and Kabardino-Balkaria. Eurasian Geography and Economics 52(5), p. 1-30.

O'Loughlin, John/Linke, Andrew M./Witmer, Frank D. W. (2014): Modeling and data choices sway conclusions about climate-conflict links. PNAS 111(6), p. 2054-2055.

O'Loughlin, John/Witmer, Frank D.W./Linke, Andrew M./Laing, Arlene/Gettelman, Andrew/Dudhia, Jimy (2012): Climate variability and conflict risk in East Africa, 1990-2009. PNAS 109(45), p. 18344-18349.

O'Hara, Sarah L. (2000): Central Asia's water resources: contemporary and future water management issues. Water Resources Development 16(3), p. 423-441.

Obioha, Emeka (2008): Climate change, population drift and violent conflict over land resources in northeastern Nigeria. Journal of Human Ecology 23(4), p. 311-324.

Ochs, Elinor/Smith, Ruth C./Taylor, Carolyn E (1996): Detective stories at dinnertime: problem solving through co-narration. In: Briggs, Charles L. (ed.): *Disorderly discourse*. Oxford: Oxford University Press, p. 95-113.

Oels, Angela (2012): From 'securitization' of climate change to 'climatization' of the security field: comparing three theoretical perspectives. In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, P. Michael/Schilling, Janpeter (eds.): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin/Heidelberg: Springer, p. 185-206.

Omelicheva, Mariya Y. (2011): Natural disasters: triggers of political instability? International Interactions 37(4), p. 441-465.

Omolo, Nancy A. (2010): Gender and climate change-induced conflict in pastoral communities: case study of Turkana in northwestern Kenya. African Journal on Conflict Resolution 10(2), p. 81-102.

Onuoha, Freedom C. (2010): Climate change, population surge and resource overuse in Lake Chad area. In: Mwiturubani, Donald Anthony/van Wyk, Jo-Ansie (eds.): *Climate change and natural resource conflicts in Africa*. Pretoria: ISS, p. 23-44.

Oodgard, Rie (2006): Land rights and land conflicts in Africa: the Tanzania case. Copenhagen: DIIS.
Osiander, Andreas (1998): Rereading early twentieth-century IR theory: idealism revisited International Studies Quarterly 42(3), p. 409-432.
Otto, Antje/Leibenath, Markus (2014): The interrelation between collective identities and place concepts in local wind energy conflicts. Local Environment 19(
Oviedo, Paola (1999): The Galapagos Islands: conflict management in conservation and sustainable resource management. In: Buckles, Daniel (ed.): *Cultivating peace: conflict and collaboration in natural resource management*. Washington DC: World Bank, p. 163-182.
Ovuka, Mira/Lindqvist, Sven (2000): Rainfall variability in Murang'a district, Kenya: meteorological data and farmers' perception. Geografiska Annaler A 82(1), p. 107-119.
Palmer, Charles/Engel, Stefanie (2007): For better or for worse? Local impacts of the decentralization of Indonesia's forest sector. World Development 35(12), p. 2131-2149.
Peluso, Nancy Lee/Watts, Michael (2001): Violent environments. In: Peluso, Nancy Lee/Watts, Michael (eds.): *Violent environments*. Ithaca/London: Cornell University Press, p. 3-38.
Peluso, Nancy Lee/Watts, Michael (2003): Violent environments: responses. Environmental Change and Security Project Report 9(1), p. 93-96.
Pemstein, Daniel/Meserve, Stephen A./Melton, James (2010): Democratic compromise: a latent variable analysis of ten measures of regime type. Political Analysis 18(4), p. 426-449.
Pinkaew, Laungaramsri (2000): The ambiguity of the "watershed": the politics of people and conservation in northern Thailand. Sojourn 15(1), p. 52-75.
Pinstrup-Andersen, Per/Shimokawa, Satoru (2008): Do poverty and poor health and nutrition increase the risk of armed conflict onset? Food Policy 33(6), p. 513-520.
PNA/PWA (2012): Palestinian water sector: status summary report, September 2012. http://www.ewash.org/files/library/Water%20summary%20for%20AHLC%20report%20FINAL.pdf (10/08/2013).
Ponzio, Richard (2005): The Solomon Islands: the UN and interventions by coalitions of the willing. International Peacekeeping 12(2), p. 173-188.
Popp, Herbert (1983): Überpumpung als "Manmade Hazard" im Sousstal (Südmarokko): sozialgeographische Aspekte exzessiver Grundwasserausbeutung. Erdkunde 37(1), p. 97-109.
Powell, Joe (2010): Karamoja: a literature review. London: Saferworld.
Prediger, Sebastian/Vollan, Björn/Herrmann, Benedikt (2014): Resource scarcity and antisocial behavior. Journal of Public Economics 119(1), p. 1-9.
Quiroga, Diego (2009): Crafting nature: the Galapagos and the making and unmaking of a "natural laboratory". Journal of Political Ecology 16(1), p. 123-140.
Ragin, Charles C. (1987): *The comparative method: moving beyond qualitative and quantitative strategies*. Berkeley: University of California Press.
Ragin, Charles C. (2006): Set relations in social research: evaluating their consistency and coverage. Political Analysis 14(3), p. 291-310.
Ragin, Charles C. (2009): Qualitative Comparative Analysis using fuzzy sets (fsQCA). In: Rihoux, Benoît/Ragin, Charles C. (eds.): *Configurational comparative methods: Qualitative Comparative Analysis (QCA) and related techniques*. Thousand Oaks: Sage, p. 87-122.
Rahmstorf, Stefan/Schellnhuber, Hans-Joachim (2007): *Der Klimawandel: Diagnose, Prognose, Therapie*. München: C.H. Beck.
Raleigh, Clionadh/Kniveton, Dominic (2012): Come rain or shine: an analysis of conflict and climate variability in East Africa. Journal of Peace Research 49(1), p. 51-64.
Raleigh, Clionadh/Linke, Andrew/Hegre, Håvard/Karlsen, Joakim (2010): Introducing ACLED: an armed conflict location and event dataset. Journal of Peace Research 47(5), p. 651-660.
Raleigh, Clionadh/Linke, Andrew/O´Loughlin, John (2014): Extreme temperatures and violence. Nature Climate Change 4(2), p. 76-77.

Raleigh, Clionadh/Urdal, Henrik (2007): Climate change, environmental degradation and armed conflict. Political Geography 26(6), p. 674-694.

Rathbun, Brian C. (2008): Interviewing and qualitative field methods: pragmatism and practicalities. In: Box-Steffensmeier, Janet M./Brady, Henry E./Collier, David (eds.): *The Oxford Handbook of political methodology*. New York: Oxford University Press, p. 685-701.

Ratner, Blake D./Meinzen-Dick, Ruth/May, Candace/Haglund, Eric (2013): Resource conflict, collective action, and resilience: an analytical framework. International Journal of the Commons 7(1), p. 183-208.

Ravnborg, Helle Munk/Bustamante, Rocio/Cissé, Abdoulaye/Cold-Ravnkilde, Signe M./Cossio, Vladimir/Djiré, Moussa/Funder, Mikkel/Gómez, Ligia I./Le, Phuong/Mweemba, Carol/Nyambef, Imasiku/Paz, Tania/Pham, Huong/Rivas, Roberto/Skielboe, Thomas/Yen, Nguyen T. B. (2012): Challenges of local water governance: the extent, nature and intensity of local water-related conflict and cooperation. Water Policy 14(2), p. 336-357.

Reboratti, Carlos (2012): Socio-environmental conflict in Argentina. Journal of Latin American Geography 11(2), p. 3-20.

Reidpath, Daniel D./Allotey, Pascale (2003): Infant mortality rate as an indicator of population health. Journal of Epidemiology & Community Health 57(5), p. 344-346.

Resosudarmo, Ida Aju Pradnja (2004): Closer to people and trees: will decentralisation work for the people and forests of Indonesia? European Journal of Development Research 16(1), p. 110-132.

Rettberg, Simone (2010): Contested narratives of pastoral vulnerability and risk in Ethiopia's Afar region. Pastoralism 1(2), p. 248-273.

Reuveny, Rafael (2007): Climate change-induced migration and violent conflict. Political Geography 26(6), p. 656-673.

Reuveny, Rafael (2008): Ecomigration and violent conflict: case studies and public policy implications. Human Ecology 36(1), p. 1-13.

Rihoux, Benoît/Marx, Axel (2013): Qualitative Comparative Analysis at 25: state of play and agenda. Political Research Quarterly 66(1), p. 167-171.

Ringmar, Erik (1996): *Identity, interest and action: a cultural explanation of Sweden's intervention in the Thirty Years War*. Cambridge: Cambridge University Press.

Robbins, Paul (2004): *Political ecology: a critical introduction*. Malden: Blackwell.

Rønnfeldt, Carsten (1997): Three generations of environment and security research. Journal of Peace Research 34(4), p. 473-482.

Ross, Michael (2004): Does natural resource wealth influence civil war? Evidence from 13 cases. International Organization 58(1), p. 35-67.

Rouyer, Alwyn R. (1996): Zionism and water: influences on Israel's future water policy during the pre-state period. Arab Studies Quarterly 18(4), p. 25-47.

Rowhani, Pedram/Degomme, Olivier/Guha-Sapir, Debarati/Lambin, Eric (2011): Malnutrition and conflict in East Africa: the impacts of resource variability on human security. Climatic Change 105(1), p. 207-222.

Rustad, Siri Camilla Aas/Buhaug, Halvard/Falch, Åshild/Gates, Scott (2011): All conflict is local: modeling sub-national variation in civil conflict risk. Conflict Management and Peace Science 28(1), p. 15-40.

Rustad, Siri/Rød, Jan Ketil/Larsen, Wenche/Gleditsch, Nils Petter (2008): Foliage and fighting: forest resources and the onset, duration, and location of civil war. Political Geography 27(7), p. 761-782.

Rutten, Marcel/Moses, Mwangi (2014): How natural is natural? Seeking conceptual clarity over natural resources and conflicts. In: Bavinck, Maarten/Pellegrini, Lorenzo/Mostert, Erik (eds.): *Conflicts over natural resources in the global south: conceptual approaches*. Boca Raton: CRC Press, p. 51-70.

Saha, Sujan (2012): Security implications of climate refugees in urban slums: a case study from Dhaka, Bangladesh. In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin/Heidelberg: Springer, p. 595-611.

Salayo, Nerissa D./Ahmed, Mahfuzuddin/Garces, Len/Viswanathan, Kuperan (2006): An overview of fisheries conflicts in South and Southeast Asia: recommendations, challenges and directions. NAGA 29(1-2), p. 11-20.

Salehyan, Idean (2008): From climate change to conflict? No consensus yet. Journal of Peace Research 45(3), p. 315-326.

Salehyan, Idean/Hendrix, Cullen (2012): Social conflict in Africa database version 3.0, codebook and coding procedures. Austin: Robert S. Strauss Center.

Salehyan, Idean/Hendrix, Cullen (2014): Climate shocks and political violence. Global Environmental Change 28(1), p. 239-250.

Sambanis, Nicholas (2004): Using case studies to expand economic models of civil war. Perspectives on Politics 2(2), p. 259-279.

Scheffran, Jürgen/Battaglini, Antonella (2011): Climate and conflicts: the security risks of global warming. Regional Environmental Change 11(1), p. S27-S39.

Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.) (2012a): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin: Springer.

Scheffran, Jürgen/Brzoska, Michael/Kominek, Jasmin/Link, P. Michael/Schilling, Janpeter (2012b): Climate change and violent conflict. Science 336(6083), p. 869-871.

Scheffran, Jürgen/Brzoska, Michael/Kominek, Jasmin/Link, P. Michael/Schilling, Janpeter (2012c): Disentangling the climate-conflict-nexus: empirical and theoretical assessment of vulnerabilities and pathways. Review of European Studies 4(5), p. 1-15.

Scheffran, Jürgen/Link, Peter Michael/Schilling, Janpeter (2012d): Theories and models of the climate-security interaction: Framework and application to a climate hot spot in North Africa In: Scheffran, Jürgen/Brzoska, Michael/Brauch, Hans Günter/Link, Peter Michael/Schilling, Janpeter (eds.): *Climate change, human security and violent conflict: challenges for societal stability*. Berlin/Heidelberg: Springer, p. 91-131.

Scheffran, Jürgen/Marmer, Elina/Sow, Papa (2012e): Migration as a contribution to resilience and innovation in climate adaptation: social networks and co-development in Northwest Africa. Applied Geography 33(1), p. 119-127.

Scheffran, Jürgen/Ide, Tobias/Schilling, Janpeter (2014): Violent climate or climate of violence? Concepts and relations with focus on Kenya and Sudan. International Journal of Human Rights 18(3), p. 366-387.

Schilling, Janpeter (2012): *On rains, raids and relations: a multimethod approach to climate change, vulnerability, adaptation and violent conflict in northern Africa and Kenya*. Hamburg: PhD thesis.

Schilling, Janpeter/Opiyo, Francis/Scheffran, Jürgen (2012): Raiding pastoral livelihoods: motives and effects of violent conflict in north-eastern Kenya. Pastoralism 2(25), p. 1-16.

Schilling, Janpeter/Opiyo, Francis/Scheffran, Jürgen/Weinzierl, Thomas (2014): On raids and relations: climate change, pastoral conflict and adaptation in northwestern Kenya. In: Bronkhorst, Salomé/Bob, Urmilla (eds.): *Climate change and conflict: where to for conflict sensitive climate adaptation in Africa?* . Berlin: BWV, p. 241-267.

Schilling, Janpeter/Scheffran, Jürgen/Link, Michael (2010): Climate change and land use conflicts in northern Africa. Nova Acta Leopoldina 112(1), p. 173-182.

Schneider, Carsten Q./Wagemann, Claudius (2010): Standards of good practice in Qualitative Comparative Analysis (QCA) and fuzzy-sets. Comparative Sociology 9(3), p. 397-418.

Schneider, Carsten Q./Wagemann, Claudius (2012): *Set-theoretic methods for the social sciences: a guide to qualitative comparative analysis*. Cambridge: Cambridge University Press.

Schneider, Gerald/Gleditsch, Nils Petter/Carey, Sabine C. (2010): Exploring the past, anticipating the future: a symposium. International Studies Review 12(1), p. 1-7.

Schröder-Wildberg, Esther/Carius, Alexander (2003): *Illegal logging, conflict and the business sector in Indonesia*. Berlin: InWent.

Schrope, Mark (2000): Galapagos ecologists under threat from violent protests. Nature 408(6814), p. 761.

Sehring, Jenniver/Giese, Ernst (2011): Global environmental change and conflict potential in Central Asia. In: Brauch, Hans Günter/Oswald Spring, Úrsula/Mesjasz, Czeslaw/Grin, John/Kameri-Mbote, Patricia/Chourou, Béchir/Dunay, Pal/Birkmann, Jörn (eds.): *Coping with global environmental change, disasters and security*. Berlin/Heidelberg: Springer, p. 525-534.

Selby, Jan (2003a): Dressing up domination as 'cooperation': the case of Israeli-Palestinian water relations. Review of International Studies 29(1), p. 121-138.

Selby, Jan (2003b): *Water, power and politics in the Middle East: the other Israeli-Palestinian conflict*. London: Tauris.

Selby, Jan (2005): The geopolitics of water in the Middle East: fantasies and realities. Third World Quarterly 26(2), p. 329-349.

Selby, Jan (2009): 'New security thinking' in Israeli-Palestinian water relations. In: Brauch, Hans Günter/Oswald Spring, Úrsula/Grin, John/Mesjasz, Czeslaw/Kameri-Mbote, Patricia/Chadha Behera, Navnita/Courou, Béchir/Krummenacher, Heinz (eds.): *Facing global environmental change: environment, human, energy, food, health and water security concepts*. Berlin/Heidelberg: Springer, p. 623-631.

Selby, Jan (2013): Cooperation, domination and colonisation: the Israeli-Palestinian joint water committee. Water Alternatives 6(1), p. 1-24.

Selby, Jan/Hoffmann, Clemens (2014): Beyond scarcity: rethinking water, climate change and conflict in the Sudans. Global Environmental Change, forthcoming.

Seng, Keang/Song, Srun Lim/Navy, Hap/Leang, Seng (2005): Conflicts arising from re-allocation of fishing lots: perceptions from community fisheries in Cambodia. Phnom Penh: World Fish Center.

Shrestha, Ram K./Alavalapati, Janaki R.R. (2006): Linking conservation and development: an analysis of local people's attitude towards Koshi Tappu Wildlife Reserve, Nepal. Environment, Development and Sustainability 8(1), p. 69-84.

Shuval, Hillel (2007): 'Virtual water' in the water resource management of the arid Middle East. In: Shuval, Hillel/Dweik, Hassan (eds.): *Water resources in the Middle East: Israel-Palestinian water issues - from conflict to cooperation*. Berlin/Heidelberg: Springer, p. 133-139.

Simiyu, Robert Romborah (2008): *Militanisation of resource conflicts: the case of land-based conflict in the Mount Elgon region of western Kenya*. Pretoria: ISS.

Simmons, Cynthia (2004): The political economy of land conflict in the eastern Brazilian Amazon. Annals of the Association of American Geographers 94(1), p. 183-206.

Simmons, Cynthia (2005): Territorializing land conflicts: space, place, and contentious politics in the Brazilian Amazon. GeoJournal 64(4), p. 307-317.

Simmons, Cynthia/Walker, Robert T./Arima, Eugenio Y./Aldrich, Stephen P./Caldas, Marcellus M. (2007): The Amazon land war in the south of Pará. Annals of the Association of American Geographers 97(3), p. 567-592.

Simon, Julian (1989): Paradoxically, population growth may eventually end wars. Journal of Conflict Resolution 33(1), p. 164-180.

Simons, Claudia/Zanker, Franzisca (2012): Finding cases that fit: methodological challenges in peace research, GIGA working paper 189. Hamburg: GIGA.

Skaaning, Svend-Erik (2011): Assessing the robustness of crisp-set and fuzzy-set QCA results. Sociological Methods & Research 40(2), p. 391-408.

Slettebak, Rune T. (2012): Don't blame the weather! Climate-related natural disasters and civil conflict. Journal of Peace Research 49(1), p. 163-176.

Solow, Andrew R. (2013): A call for peace on climate and conflict. Nature 497(7448), p. 179-180.

Sonneveld, Benjamin G. J. S./Dent, David L. (2009): How good is GLASOD? Journal of Environmental Management 90(1), p. 274-283.
Spiritos, Erica/Lipchin, Clive (2013): Desalination in Israel. In: Becker, Nir (ed.): *Water policy in Israel: context, issues and options*. Berlin: Springer, p. 101-123.
Stark, Jeffrey/Terasawa, Katsuaki/Ejihu, Mersie (2011): Climate change and conflict in pastoralist regions of Ethiopia: mounting challenges, merging responses. Washington D.C: USAID.
Starr, Joyce (1991): Water wars. Foreign Policy 82(1), p. 17-36.
Staub, Ervin (2001): Individual and group identities in mass killing and genocide. In: Ashmore, Richard/Jussim, Lee/Wilder, David (eds.): *Social identity, intergroup conflict, and conflict reduction*. Oxford: Oxford University Press, p. 159-184.
Steinke, Ines (2012): Gütekriterien qualitativer Forschung. In: Flick, Uwe/von Kardorff, Ernst/Steinke, Ines (eds.): *Qualitative Forschung: ein Handbuch*. Reinbek: Rowohlt, p. 319-331.
Sterzel, Till/Lüdeke, Matthias/Kok, Marcel/Walther, Carsten/Sietz, Diana/de Soysa, Indra/Lucas, Paul/Janssen, Peter (2014): Armed conflict distribution in global drylands through the lens of a typology of socio-environmental vulnerability. Regional Environmental Change 14(4), p. 1419-1435.
Stetter, Stephan/Herschinger, Eva/Teichler, Thomas/Albert, Mathias (2011): Conflicts about water: securitization in a global context. Conflict and Cooperation 46(4), p. 441-459.
Stites, Elizabeth/Fries, Lorin/Akabwai, Darlington (2010): Foraging and fighting: community perspectives on natural resources and conflict in southern Karamoja. Somerville: Feinstein International Center.
Streich, Philip A./Mislan, David Bell (2014): What follows the storm? Research on the effect of disasters on conflict and cooperation. Global Change, Peace & Security 26(1), p. 55-70.
Stritzel, Holger (2007): Towards a theory of securitization: Copenhagen and beyond. European Journal of International Relations 13(3), p. 357-383.
Sundberg, Ralph/Lindgren, Mathilda/Padskocimaite, Ausra (2011): UCDP GED codebook version 1.0-2011. Uppsala: Department of Peace and Conflict Research (Uppsala University).
Sundberg, Ralph/Melander, Erik (2013): Introducing the UCDP georeferenced event dataset. Journal of Peace Research 50(4), p. 523-532.
Suzuki, Shogo (2007): The importance of 'Othering' in China's national identity: Sino-Japanese relations as a stage of identity conflicts. The Pacific Review 20(1), p. 23-47.
Swyngedouw, Erik (2004): Scaled geographies: nature, place, and the politics of scale. In: Sheppard, Eric/McMaster, Robert B. (eds.): *Scale and geographiy inquiry: nature, society, and method*. Malden: Blackwell, p. 129-153.
Tagar, Zecharya/Qumsieh, Violet (2006): A seeping time bomb: pollution of the mountain aquifer by solid waste. Amman/Bethlehem/Tel Aviv: FoEME.
Temesgen, Amsale K. (2010): Climate change to conflict? Lessons from southern Ethiopia and northern Kenya. Oslo: Fafo.
Theisen, Ole Magnus (2008): Blood and soil? Resource scarcity and internal armed conflict revisited. Journal of Peace Research 45(6), p. 801-818.
Theisen, Ole Magnus (2012): Climate clashes? Weather variability, land pressure, and organized violence in Kenya, 1989-2004. Journal of Peace Research 49(1), p. 81-96.
Theisen, Ole Magnus/Gleditsch, Nils Petter/Buhaug, Halvard (2013): Is climate change a driver of armed conflict? Climatic Change 117(3), p. 613-625.
Theisen, Ole Magnus/Holtermann, Helge/Buhaug, Halvard (2012): Climate wars? Assessing the claim that drought breeds conflict. International Security 36(3), p. 79-106.
Themnér, Lotta/Wallensteen, Peter (2011): Armed conflict, 1946-2010. Journal of Peace Resarch 48(4), p. 525-536.

Thompson, Lonnie G./Brecher, Henry H./Mosley-Thompson, Ellen/Hardy, Douglas R./Mark, Bryan G. (2009): Glacier loss on Kilimanjaro continues unabated. PNAS 106(47), p. 19770-19775.

Timura, Christopher (2001): "Environmental conflict" and the social life of environmental security discourse. Anthropological Quarterly 74(3), p. 104-113.

Tollefsen, Andreas Forø (2012): PRIO-GRID codebook. Oslo: PRIO.

Tollefsen, Andreas Forø/Strand, Håvard/Buhaug, Halvard (2012): PRIO-GRID: a unified spatial data structure. Journal of Peace Research 49(2), p. 363-374.

Tranholm-Mikkelsen, Jeppe (1991): Neo-functionalism: obstinate or obsolete? A reappraisal in the light of the new dynamism of the EC. Millenium 20(1), p. 1-22.

Trombetta, M. J. (2008): Environmental security and climate change: analysing the discourse. Cambridge Review of International Affairs 21(4), p. 585-602.

Trottier, Julie (1999): *Hydropolitics in the West Bank and Gaza*. Jerusalem: PASSIA.

Turner, Bertram (1999): Agrarethnographie, Ressourcennutzung und die Persistenz traditioneller kollektiver Wertvorstellungen und Rechtsauffassungen im Souss, Marokko. In: Hahn, Hans Peter/Spittler, Gerd (eds.): *Afrika und die Globalisierung*. Hamburg: LIT, p. 491-501.

Turner, Matthew (2006): The micropolitics of common property management on the Maasina floodplains in Central Mali. Canadian Journal for African Studies 40(1), p. 41-75.

Twite, Robin (2009): Security and environment and the Israel-Palestine conflict. In: Brauch, Hans Günter/Oswald Spring, Úrsula/Grin, John/Mesjasz, Czeslaw/Kameri-Mbote, Patricia/Chadha Behera, Navnita/Courou, Béchir/Krummenacher, Heinz (eds.): *Facing global environmental change: environment, human, energy, food, health and water security concepts*. Berlin/Heidelberg: Springer, p. 865-872.

U.S. Department of State (2013): Secretary Kerry holds a Google+ hangout with NBC's Andrea Mitchell. http://www.state.gov/secretary/remarks/2013/05/209273.htm (15/11/2013).

UBOS (2006): The 2002 Uganda population and housing census, education and literacy. Kampala: UBOS.

Udasin, Sharon (2013): PA accuses Israel of blocking water resources. The Jerusalem Post, 24/03/2013.

UN (2004): Living with risk: a global review of disaster reduction initiatives. Geneva: UNISDR.

UNDP (2004): Solomon Islands peace and conflict development analysis: emerging priorities in preventing future violent conflict. New York: UNDP.

UNOCHA (2008): Focus on Karamoja: special report No. 2. Nairobi: UNOCHA.

UNOCHA (2009): Focus on Karamoja: special report No. 4 - January to June 2009. Nairobi: UN OCHA.

Urdal, Henrik (2005): People vs. Malthus: population pressure, environmental degradation, and armed conflict revisited. Journal of Peace Research 42(4), p. 417-434.

Urdal, Henrik (2008): Population, resources, and political violence: A subnational study of India, 1956-2002. Journal of Conflict Resolution 52(4), p. 590-617.

Vairavamoorthy, Kalanithy /Yan, Jimin/Galgale, Harshal M./Gorantiwar, Sunil D. (2007): IRA-WDS: a GIS-based risk analysis tool for water distribution systems. Environmental Modelling & Software 22(7), p. 951-965.

Vandergeest, Peter (2003): Racialization and citizenship in Thai forest politics. Society and Natural Resources 16(1), p. 19-37.

Vasquez, John (1997): War endings: what science and constructivism can tell us. Millenium 26(3), p. 651-678.

Verhoeven, Harry (2011): Climate change, conflict and development in Sudan: global Neo-Malthusian narratives and local power struggles. Development and Change 42(3), p. 679-707.

Vis, Barbara (2012): The comparative advantages of fsQCA and regression analysis for moderately large-N analyses. Sociological Methods & Research 41(1), p. 168-198.

Vivekanada, Janani/Schilling, Janpeter/Mitra, Shreya/Pandey, Nisha (2014): On shrimp, salt and security: livelihood risks and responses in South Bangladesh and East India. Environment, Development and Sustainability 16, forthcoming.

Vreeland, James Raymond (2008): The effect of political regime on civil war: unpacking anocracy. Journal of Conflict Resolution 52(3), p. 401-425.

Waintraub, Nicole (2009): Water and the Middle East peace process. Potentia 1(1), p. 23-35.

Ward, Christopher (2009): Water conflict in Yemen: the case for strengthening local resolution mechanisms. In: Jagannathan, N. Vijay/Mohamed, Ahmed Shawky/Kremer, Alexander (eds.): *Water in the Arab World: managements perspectives and innovations*. Washington DC: World Bank, p. 233-268.

Warner, Coco/Afifi, Tamer (2014): Where the rain falls: evidence from 8 countries on how vulnerable households use migration to manage the risk of rainfall variability and food insecurity. Climate and Development 6(1), p. 1-17.

Watercare (2004): *Water*. Jerusalem: Mulilateral Working Group on Water Resources.

Watts, Michael (2004): Resource curse? Governmentality, oil and power in the Niger delta, Nigeria. Geopolitics 9(1), p. 50-80.

WBGU (2008): *World in transition - climate change as a security risk*. London: Earthscan.

Wegerich, Kai/Kazbekov, Jusipbek/Kabilov, Firdavs/Mukhamedova, Nozilakhon (2012): Meso-level cooperation on transboundary tributaries and infrastructure in Ferghana Valley. Water Resources Development 28(3), p. 525-543.

Weidmann, Nils B. (2013): The higher the better? The limits of analytical resolution in conflict event datasets. Cooperation and Conflict 48(4), p. 567-576.

Wight, Colin (2013): Philosophy of social science and International Relations. In: Carlsnaes, Walzer/Risse, Thomas/Simmons, Beth A. (eds.): *Handbook of International Relations*. London: Sage, p. 29-57.

Wilkinson, Claire (2007): The Copenhagen School on tour in Kyrgyzstan: is securitization theory useable outside Europe? Security Dialogue 38(1), p. 5-25.

Williams, I/Muazu, F./Kaoje, U./Ekeh, R. (1999): Conflicts between pastoralists and agriculturalists in north-eastern Nigeria. In: Onigu, Otite/Isaac, Olawale Albert (eds.): *Community conflicts in Nigeria: management, resolution and transformation*. Ibadan: Spectrum Books, p. 184-219.

Wischnath, Gerdis/Buhaug, Halvard (2014): On climate variability and civil war in Asia. Climatic Change 122(4), p. 709-721.

Witsenburg, Karen M./Adano, Wario R. (2009): Of rain and raids: violent livestock raiding in Northern Kenya. Civil Wars 11(4), p. 514-538.

Wittayapak, Chusak (2008): History and geography of identifications related to resource conflicts and ethnic violence in northern Thailand. Asian Pacific Viewpoint 49(1), p. 111-127.

Wolf, Aaron T./Yoffe, Shira B./Giordano, Mark (2003): International waters: identifying basins at risk. Water Policy 5(1), p. 29-60.

World Bank (2013a): GDP growth (annual %). http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2 (17/04/2013).

World Bank (2013b): Turn down the heat: climate extremes, regional impacts and the case for resilience. Washington DC: World Bank.

Yamaguchi, Kensuke (2007): Scarcity of and conflict over resources: Chom Thong water conflict. In: Nippon Foundation (ed.): *Reflections on the human condition: change, conflict and modernity*. Tokyo: Nippon Foundation, p. 59-67.

Yang, Liang/Scheffran, Jürgen/Qin, Huapeng/You, Qinglong (2014): Climate-related flood risks and urban responses in the Pearl River Delta, China. Regional Environmental Change 14, forthcoming.

Yasmi, Yurdi (2003): Understanding conflict in the co-management of forests: the case of Bulugan research forest. International Forest Review 5(1), p. 38-44.

Yasmi, Yurdi/Anshari, Gusti Z./Komarudin, Heru/AlQadri, Syarif (2006): Stakeholder conflicts and forest decentralization policies in West Kalimantan: their dynamics and implications for future forest management. Forests, Trees and Livelihoods 16(2), p. 167-180.

Yeh, Emily T. (2000): Forest claims, conflicts and commodification: the political ecology of Tibetan mushroom-harvesting villages in Yunnan province, China. China Quarterly 161(1), p. 264-278.

York, Jodi (2002): Forests for whom? Ethnic politics of conservation in northern Thailand, 1996-2001. Berkely Journal of Sociology 46(1), p. 132-154.

Zapata Erazo, Carlos (2005): Participatory management in the Galapagos, Ecuador from a constructionist perspective: between perception and reality. In: Correa, Hernán Darío/Rodríguez, Iokiñe (eds.): *Environmental crossroads in Latin America: between managing and transforming natural resource conflicts*. San Jose: University of Peace, p. 194-212.

Zeitoun, Marc (2008): *Power and water in the Middle East: the hidden politics of the Palestinian-Israeli water conflict*. London: Tauris.

Zeitoun, Marc/Talhami, Michael/Eid-Sabbagh, Karim (2013): The influence of narratives on negotiations and resolution of the upper Jordan river conflict. International Negotiation 18(2), p. 293-322.

Zeitoun, Mark (2009): *The political economy of water demand management in Yemen and Jordan: a synthesis of findings*. Ottawa: IDRC.

Zeitoun, Mark/Mirumachi, Naho (2008): Transboundary water interaction I: reconsidering conflict and cooperation. International Environmental Agreements 8(4), p. 297-316.

Zhang, Shaoying (2014): Between policies and the unintended consequences: the role of the governing and the governed communist officials in China. Presented at the Tenth International Congress of Qualitative Inquiry, Urbana-Champaign, 21-24/05/2014.

Zhijun, Tong/Jiquan, Zhang/Xingpeng , Liu (2009): GIS-based risk assessment of grassland fire disaster in western Jilin province, China. Stochastic Environmental Research and Risk Assessment 23(4), p. 463-471.

Ziervogel, Gina/Cartwright, Anton/Tas, Adriaan/Adejuwon, James/Zermoglio, Fernanda/Shale, Moliehi/Smith, Ben (2008): Climate change and adaptation in African agriculture. Stockholm: Rockefeller Foundation.

Zinnes, Dina (1976): The problem of cumulation. In: Rosenau, James N. (ed.): *In search of global patterns*. New York: Free Press, p. 161-166.