

Climate change and conflict in Africa - case study Darfur



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Author of thesis:

Bright Donkoh

Thesis supervisor:

Ing. Zbyšek Korecki, Ph

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Dedication

I wish to thank the almighty God for his support and courage throughout my study. I also want to thank my family especially, daddy for his encouragement and psychological support He has always offered me. Lastly, I want to say thank you to all my friends and anybody who might have influenced my life positively or negatively, I learnt lesson from all of you.

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Abstract

The aim of the thesis is to analyse possible relationship between the climate change, conflict and security level in Darfur, Sudan. The prevalence of drought, inconsistency in rainfall, desertification and other consequences ensuing from environmental changes weaken the adaptability capacity of the African continent. The Earth's climate has changed throughout the history of man. In the last 650,000 years, there have been seven cycles of glacial movement and retreat coupled with the abrupt end of the last ice age about 7,000 years ago which marked the beginning of the modern climate era and of human civilization and development. The indicators of climate change in Darfur deepened in 1980s when the region observed a severe famine and drought, as a result more people are competing for access to land, water and other natural resources in Darfur region. During 2003, the conflict turned to be an armed conflict among the various tribes over natural resources, particularly water and land.

Individuals in Darfur have been devastated by war, and its aftermath has been sorrowful story of suffering, displacement, death, among others. Simultaneously, the war has become one of the most distorted and misunderstood conflicts in history of recent years. Experts and activists have oversimplified the causes of the conflict, slighting its historical and systemic origins. The study examined the extent to which conflicts are erupted as a result of geographical variations, thus climate change. This is especially using the Darfur region as a case study. A case study method was adopted to better enable the researcher to meet the intended research objectives for this study. Through this study, it has been shown that deterioration in the climate and environment alone may not lead to conflict, as local populations have learned to adapt to their environments. This is when it becomes associated with other social, economic and political factors that aggravate scarcity that conflict become more probable.

Key words: Conflict, Climate Change, Impact, Famine, War or Security

Abstrakt

Cílem práce je analyzovat možný vztah mezi změnou klimatu a úrovní bezpečnosti v Dárfúru v Súdánu. Převládání sucha, nekonzistence srážek, dezertifikace a další dopady vyplývající ze změn životního prostředí oslabují schopnost adaptability afrického kontinentu. Zemské klima se měnilo již od počátku lidstva. Během posledních 650 000 let země prošla celkem sedmi cykly ledovcových hnutí a ústupů, spojených s náhlým koncem poslední doby ledové asi před 7 000 lety, což znamenalo začátek moderní klimatické doby a rozvoje lidské civilizace.

Indikátory změn klimatu v Dárfúru se prohloubily v 80. letech, kdy region postihnul silný hladomor a období sucha, což v dané oblasti předznamenalo souboje o půdu, vodu a další přírodní zdroje. Během roku 2003 situace přerostla do ozbrojeného konfliktu mezi různými kmeny o tyto zdroje, zejména poté vodu a půdu.

Obyvatelé Dárfúru zůstávají zničení válkou, jejíž následky jsou smutným příběhem o utrpení, vyhnání z domovů a smrti. Současně se válka stala jedním z nejvíce zkradených a nepochopených konfliktů v dějinách posledních let. Odborníci a aktivisté příliš zjednodušují příčiny konfliktu, přičemž podceňují jeho historický a systémový kontext. Studie zkoumala, do jaké míry konflikty vyvstávají v důsledku geografických změn, tedy změn klimatu, přičemž je podložena případovou studií právě z dárfúrské oblasti. Metoda případové studie umožnila autorovi splnit zamýšlené výzkumné cíle této práce. Prostřednictvím studie bylo poukázáno na fakt, že samotné zhoršení klimatu a životního prostředí nemusí vést ke konfliktu, neboť se místní obyvatelé naučili přizpůsobit danému prostředí. Ve spojení s jinými sociálními, ekonomickými a politickými faktory, které životní podmínky obyvatel ještě zhoršují, se však konflikt stává pravděpodobnějším.

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Preface

Africa will be one of the continents severely hit by the impact of climate change. The prevalence of drought, inconsistency in rainfall, desertification and other consequences ensuing from environmental changes weaken the adaptability capacity of the continent. Numerous African countries are characterised by relentless poverty and have unsupportable infrastructures as well as weak governance mechanisms that contribute to instability of political parties. According to Francois and Sud (2006) these fragile states have an increased risk of conflict. Moreover, if the basic causes of conflict were not fully tackled during post conflict resolutions. Stakeholders', participatory, reflective and indigenous policy processes are required to translate these concerns into efficient, unassailable and practically implementable procedures for adaptive modification.

According to IPCC (2014) and Niang et al. (2014), Africa has been recognised as one of the parts of the world most susceptible to the impacts of climate change. Since the Earth was formed over four billion years ago, the climate of the world has periodically shifted from warm to cool and back again occasionally vividly (Hardy, 2003). Nevertheless, for the last few years, our planet has been heating up very fast mainly as a result of artificial reasons. Global warming poses negative effects on our society and the ecosystem in an extensive diversified way. The Intergovernmental Panel on Climate Change (IPCC) emphasised in their 2014 valuation report that African ecosystems are now being affected by climate change and therefore future impacts are expected to be extensive (Niang & Ruppel, 2014). The outcome shows that it is possible land temperatures all over Africa may rise quicker than the mean temperatures world wide, mainly in the drier regions of the continent. With the purpose of adapting to the recurring environmental variations, human beings usually follow three diverse approaches: stay in place and do nothing, acknowledging the costs, stay in place and adapt to variations, or leave the areas affected (Reuveny, 2007). Most of the African countries are unable to mitigate or acclimatise to environmental changes due to poverty, stumpy level of technological advancement and over dependence on natural renewable resources (Reuveny, 2007). Whereas environmental change has long been recognised as one of the main influences of migration, not until recently it has been obviously marginal in migration research works (Tacoli, 2011). To some extent, this is because the interest has intensive primarily on the socioeconomic factors of migration. Yet, facing severe environmental problems, individuals in least developed countries (LDCs) could have to leave affected areas, and this in turn, may cause conflict in areas receiving these migrants (Reuveny, 2007).

Aim of the thesis

The core aim of the study is to analyse possible relationship between climate change, conflict and security in Darfur, Sudan.

Study background and details of the situation

The Earth's climate has changed throughout the history of man. In the last 650,000 years, there have been seven cycles of glacial movement and retreat coupled with the abrupt end of the last ice age about 7,000 years ago which marked the beginning of the modern climate era and of human civilization and development. Majority of these climate changes are credited to very small disparities in Earth's orbit that change the amount of solar energy that is received on the planet (NASA, 2017). The recent warming tendency is of particular significance because most of it is very probable human induced and proceeding at a rate that is unparalleled in the past 1,300 years according to Santer (1996).

According Fergusson (2015) to the impact of climate change spring from environmental to social, economic and even political impacts. Due to the growing pace of epic draught aggravated by climate change the World Bank has acknowledged that the wars of this era were over oil but in the coming one they will be over water and in 2008, Goldman Sachs called water "the petroleum for the next century". By now a billion people, or one in seven people on the planet, lack access to safe water for drinking. The Middle East, South Asia and North Africa are all anticipated to experience water shortages over the coming years because of years of bad management and overuse of their available water resource (Goldenberg, 2014). The account by the Proceedings of the United States National Academy of Sciences which is titled "Warming increases the risk of civil war in Africa" entitles that temperature rises in Africa have coincided with substantial increases in the likelihood of war in the region. Around 2007, UN Secretary General Ban Ki-moon labelled the conflict in Sudan's Darfur region as the world's first climate change conflict the world has experienced so far. The hypothesis was that water scarcity from reformed rainfall patterns resultant of climate change contributed to this conflict in Africa (Notaras, 2009).

The indicators of climate change in Darfur deepened in 1980s when the region observed a severe famine and drought, as a result more people are competing for access to land, water and other natural resources in Darfur region. During 2003, the conflict turned to be an armed conflict among the various tribes over natural resources, particularly water and land.

Impacts experienced include expanding desertification, reduced rainfall and land degradation left terrible consequences as pastoralists have migrated southwards for improved grazing for their herds, but farmers have denied them access as a result of their marginal lands comparatively. Consequently, more people from Darfur are competing for access to water, land and other natural resources than at any other time period. The augmented competition only further aggravates the already uneasy social, political and ethnic relationships in Darfur. This study will discuss the relationships between climate changes and the conflict in the Darfur region.

Statement of the problem

Individuals in Darfur have been devastated by war, and its aftermath has been sorrowful story of suffering, displacement, death among others. Simultaneously, the war has become one of the most distorted and misunderstood conflicts in history of recent years. Experts and activists have oversimplified the causes of the conflict, slighting its historical and systemic origins. Public commentators ignored the nature and the real cause of the violence in Darfur for years, instigating important misperceptions amongst the public and in the policy making community both locally and internationally.

Research Objective

The main objective of the study is to find out whether climate change impacts on the recurrent conflict linkages in the Darfur region or not.

Furthermore, the research has the following specific objectives;

- To identify the apparent causes of climate change that could create environmental challenges in the region.
- To find out relationship between climate change and security level in Darfur, Sudan.
- To examine the relationship between climate change and its effect on Agriculture.

Research Questions and Hypothesis of the Study

Research questions:

- In order to satisfy the objective of this study, the following questions were asked.
- What is the relationship between climate change and level of security in Darfur?
- How does climate change affect agriculture and the living standards of the local households?

Importance of the Study

The study is of huge relevance for academia and policy makers to generate new knowledge-based development policies that could solve human mobility and conflict which probably instigated due to climate change impacts in the Darfur region of Sudan. This study is also projected to produce reasonable evidence that could demonstrate whether or not climate change impacts have played a part in human mobility and conflict in Darfur. Conversely, the study findings expected to help other researchers in the same subject area to get a better insight about climate change its migration and conflict in Darfur and discover and explore new areas of research.

Methodology in Brief

The study is expected to examine the extent to which conflicts are erupted as a result of geographical variations thus climate change. This is especially using the Darfur region as a case study. It further examines climate whether change induced migration are linked to conflicts in the region. A case study is adopted to better enable the researcher to meet the intended research objectives for this study.

Quantitative as well as qualitative research approach has been selected for this study. The essential data for the study has been gathered double exposures framework is used to structure the analysis, as it recognises the interplay of social, political and economic factors that influence outcomes. Secondary data will also expect to fill any data gap that may not be obtained from primary data collection, (Data were mainly obtained from previously exiting publications, books, literature and documents.)

Koul (2009) emphasises the immense significance of research methods in a research process. This describes the numerous stages to be implemented in solving a research problem. For instance, the means in which the problem is outlined, definition of appropriate terms, the choice of subject for analysis, the justification of data gathering techniques and interpretation of accessible data and the measures of drawing a general conclusion.

Systematic reviews address issues by distinguishing, basically assessing and incorporating the findings of all significant, remarkable individual reviews tending to at least one research question. A decent systematic review may accomplish most or the greater part of the listed criteria below:

- Establish to what degree existing study has advanced towards enlightening a specific issue;
- Identify relations, disagreements and irregularities in the writing and investigate accounts behind these (for instance by proposing another conceptualisation or hypothesis which represents the irregularity);
- Formulate general declarations or an all-encompassing conceptualization (make a point, instead of outlining every one of the facts every other person has made; Sternberg, 1991);
- Comment on, assess, broaden, or create hypothesis;
- In doing these things, give suggestions to practice and policy planning;
- Describe guidelines for impending research.

Systematic review is thusly a bit of research in its own privilege and, by its tendency, can address substantially more extensive inquiries than single exact reviews ever can. For instance, as used by Baumeister and Leary (1997) in revealing associations among numerous discoveries. In reality, efficient reviews sit on top of other research plans at the highest point of the 'chain of command' since they can possibly give the most critical useful implications. Systematic reviews are described by being objective, orderly, straightforward and replicable. They often include an orderly inquiry procedure to seek results which relates to a specific research address and in addition a deliberate introduction and combination of the attributes and discoveries of the consequences of such a research. The criteria for consideration and avoidance in this approach are objective, unequivocally expressed and reliably executed. This is often with the objective that the choice to incorporate or reject specific reviews is clear to readers and other analysts utilizing similar criteria would likely settle on a similar conclusion.

This rapid approach devices to limit bias or predisposition and enables readers of the review to evaluate the researcher's evidence, assumptions, procedures and conclusions, as opposed to taking the researcher's decisions in reliance. This system likewise enables different researchers to keep the review up to date at a later time so as to coordinate new discoveries. According to Baumeister (2013) in order to best-accomplish the reasons for a precise review, once has to embrace the attitude of a judge and jury, as opposed to an attorney. A judge and jury suspiciously assess the proof so as to render the most attractive likely judgment. On the contrary, a legal counsellor's way to deal with the confirmation includes attempting to put forth the best defence for one side of the dispute.

Systematic review is a type of review distinctly detailed question that utilizes efficient and unequivocal strategies to recognize, select, and basically assess significant research, and to gather and dissect information from the reviews that are incorporated into the review. Meta-analysis could possibly be utilized to investigate and outline the results of the incorporated reviews (Higgins & Green, 2014).

Data collection

This thesis was conducted using a wide-range search of academic literature, newspaper, articles books and blogs. There was also an evaluation of the nature and quality of evidence presented for linking climate change and violent conflict, and a note of how these links were made. Additionally, a critical evaluation of what these writings say about climate change and violent conflict; and how different analysts make these links. The thesis additionally gathers on extra material to give a background to the literature search. Where extra material is referred to that is not drawn from the orderly literature search, this is set apart in the content. To utilize extra material was essential since the methodical review mapping as an exploration strategy reflected large portions of similar issues that is discussed in this research. As opposed to creating a list of sources that extensively covers the broadness of issues associated with violent conflict and climate change, the outcomes from the review study alone would not permit a more inside out comprehension of the hidden applied issues, as the greater part of the review are unable to fundamentally assess the models exhibited, or without a doubt to draw in basically with what sort of evidence is utilized to make the presentation of the linkage between climate change and violent conflicts.

Assessing Evidence

According to Webster's dictionary, evidence is something that delivers proof. Nonetheless, there are two central questions, thus proof of what? And then when is proof established? Ample research on climate change and conflict offers some form of evidence. But then again, the evidence provided is founded on an underlying model of how climate change influence conflict that might not be clarified much unless proven. Hence it is imperative to consider how various authors explain the source of conflict before considering only at the supposed details they present as proof. The dangers of analysing evidence deprived of considering what it represents is to get in the habit of presumptuous causal link before that notion is proven. An additional risk is to confuse causation with correlation.

Catalogue Searches

Considering the above listed concerns, methodical database searches of peer-reviewed literature dating from 2005 to the present produced a list of over 30 papers that were of greatest relevance. These search terms were used in yielding results: “conflict”, “climate change”, “war*” and “violen*”. The search approach combined ‘conflict’ with one or more of the terms “climate change”, ‘war*’ and ‘violen*’, so as to search for publications which covered the claim that climate change led to violent conflict. The search was narrowed by restricting the results to a group of conflict and climate change affected countries in Central Africa: Burundi, the Central African Republic, Chad, the Democratic Republic of the Congo and Rwanda. The focus of the literature on conflict and climate change were mostly on these countries. During the latter stage of the systematic search, there was specific inclusion question relating to each publication. This was to ascertain the evidence to support claims that climate change will lead to violent conflict and what intervening implications for policies affecting players at the local level? Publications that fell short of providing information useful to unearthing these questions were subsequently discarded.

Data preview

Compared to other evidence papers by the Justice and Security Research Programme (JSRP), the search terms were lesser in number and the inclusion criteria were practically stringent. Primarily, the limited amount of search terms suggested that most databases allowed the search process in a consistent way. Restricting the search terms to climate change alone contrary to other phrases such as “global warming” or “ecological change” was a deliberate decision that prevented the search from returning a huge number of results that were irrelevant. Climate change as a term is fairly comprehensive. Global warming normally predates climate change and is now obviously considered a more popular term. The term also encompasses broader range of potential climatic event rather than just rise in temperatures. One disadvantage is that other researches that used different terms either than climate change will not be captured from the search. This was however, not a problem as results suggested for example several papers on weather pattern based conflicts. The notion of simply searching via climate change could exclude some articles was never the case. Also, the fact that the search terms might miss publications on issues of conflict avoidance is not founded.

Widening the search

On the basis of such condemnations, it was necessary to supplement any systematic database led search with alternative search methods. Books concerning literature search were found on the online site <https://books.google.com>. This site structured for literature searches simplified the procedure. This was aided by the use of simple phrases like climate change and then linking it manually with keywords like violence, conflict and warfare. These searches were mainly carried out manually by going through key journal publications since 2005 and recovering those papers in our selection criteria. The results of the <https://books.google.com> search was suitable since it indicated recent publications on climate change and conflict. Nonetheless these results were hitherto not completely graded due to limited time and because it is uncertain whether this modified search approach was a fair representation of published books in this field. The review of periodical was also restricted to major newspapers published in English. These added methods are only complements to the broader literature search so any downsides are not particularly problematic. All of the preceding criticisms then of the research methods suggest the numerous challenges in seeking objectivity in the survey. Every critique ought to be recognised in order to improve the quality of research going forward. A much sturdier focus on newspapers and books could be vital given their influence in policy environment and academics.

Classifying the Literature

Publications from database searches were then processed. The initial stage was reading and summarising and subsequently graded with respect to the quality and nature of their findings. The reason for classifying the literature was to attempt to give an objective approach for assessing results. It should be noted however that there is no likelihood to completely eliminate subjectivity of the researcher in the process of classification. The findings itself depicts the primary assumptions of causal effect adopted by the researchers in their works. Additionally, different researchers will interpret publications and finding with respect to their own training and judgment. The evaluation of findings followed similar procedure for other suggested papers by the JSRP which had one addition that related to the basic model of cause and effect involving climate change effects assumed in each paper. This added layer of analysis gives room to move outside what is exactly being said and then into the question of how some papers justify the linkage between conflict and climate change. Predominantly within the conflict and climate change debate, it is significant to analyse only evidence being used, but precisely what type of evidence is being offered for what primary assumption of how climate change may lead

to violent conflict. Also, there was an assessment of how consistent of the evidence used; its role in creating the argument for each publication. Certainly, as discussed above, questions about 'evidence' are more vital in evaluating the linkage of climate change and violent conflict rather than simply classifying along the apparent quality of evidence.

Significance of the Study

The study will help scholars, politicians and the international community to understand the linkage between conflict and climate change in Darfur, Sudan in Central Africa and the whole continent at large.

Outline of Thesis

The research is organized into five main chapters. The first chapter presents the background of the study, tailored by research objective as well as research questions and hypotheses. This chapter also describes the importance of the study and methodology briefly. Chapter 2 contains the part that provides a brief overview about the research area, the impacts of climate change and a brief introduction to Darfur region. This chapter also contains the literature review and theoretical framework for this research. This chapter presents relevant theories concepts as well as theoretical framework for the study. Chapter 3 introduces the methodology and strategies that are used in the study. Experiential findings of the research are stated. Chapter 4 covers the findings which are analysed with the support of the theoretical framework of the study. Conclusions and recommendations of the general study will also be found in the last chapter (5).

1. Literature Review

1.0 Climate change and theoretical approach

The conceptual and theoretical literature of climate change causes conflict (CCCC) features varieties of definitions of such key terms as conflict, security, climate change, and the inter causal connections between climate change and conflict.

Climate change around the globe is one of the predominantly fundamental challenges facing the international community today and the world at large. Researchers all over the world have come out with and presented ample evidence that climate change exist and indeed occurring and that the activities of man has contributed greatly to this problem, and also it will have far-reaching implications for ecosystems, including human settlements (IPCC, 2007). A separate and connected literatures in peace and environmental studies provide the evidence that climate change is a risk multiplier that will lead to an escalation in armed conflicts (Scheffran, Brzoska, Kominek, Link, & Schilling, 2012).

The world's climate has been varying for several thousands of years. Seven thousand years ago, for instance, the Sahara was forests and a landscape of lakes. Pastoralism as a way of life developed as a response to its gradual desertification (Brooks, 2006). Nevertheless, it's now widely accepted that the burning of fossil fuels and deforestation are altering our atmosphere with a speed and scope that is unprecedented in records historically (Boko et al., 2007).

Environmental change, unmistakable from entomb yearly changes in climate designs, alludes to the long haul patterns and procedures in climate change reflected in more sweltering temperatures ("a dangerous atmospheric deviation") and more-extreme climate designs (Flannigan, Krawchuk, de Groot, Wotton and Gowman, 2009; Zhai, and Pan, 2003).

Conditions are most seriously contemplated and with specialist answered to policymakers by the Intergovernmental Panel on Climate Change, a joint logical exertion of the UN Environment Program and the World Meteorological Organization set up in 1989 in the wake of the Brundtland Report. These progressions are confirm by more-damaging tempests, especially those including battering of land masses and human homes with water from wind-blown rains and wind-cleared oceans, and furthermore, in a few areas, more-across the board, more-continuous, multiyear, and the sky is the limit from there dangerous dry spells (Messer, 2010). Environmental change is progressively alluded to as a "security risk" related with

political destabilization, which undermines state ability to adapt because of extreme climate, flooding, dry season and land debasement, or other atmosphere related changes (Brown, Hammill, McLeman, 2007; Scheffran, 2008). Some antiquated writing incorporates references to past long haul atmosphere cycles connecting shifts in the winds and the downpours, which are known to have happened in olden times, and to have carried with them natural, financial, social, and political unsettling influences (Issar, 2012). A great inquiry for interdisciplinary examination: What are the lessons such authentic discoveries of environmental change need to bestow concerning political subversion or adjustments reacting to changes in climate, water and use of land?

Environmental change is progressively conceptualized as a main variable that, in blend with the other drivers, is relied upon to create expansive impacts in the coming decades (Khan and Najam, 2009). This confining is a continuation of the "supportability" system that entered advancement thinking 20 years back (WCED, 1987). These expectations of "Starvation!" and "Cutoff points to Growth" were not really figures as wake-up calls, begging mindfulness to the threats of ecological unsustainability and requesting changes in national approaches and individuals behaviours (Lappe, Collins & Fowler, 1977).

The current and future climate in Africa

Climate change and climate variability (or unpredictability) are difficulties that already face many African nations. According to Holmes (2008), the UN approximates nine out of every 10 disasters are climate-related. It is also argued that climate change has already started to interrupt states' capacity to generate capital, to decrease gross national product and to affect human, and ultimately national, security in Africa (Garcia, 2008).

Referring to John Holmes, the Under- Secretary General for Humanitarian Affairs, "What we are witnessing is not an aberration but rather a 'curtain raiser' on the future." Such events, he suggests, are the "new normal" (Holmes, 2008). The climate of the continent is made up of seven discrete zones. Extensively different ecosystems from the Sahara to the rainforests of central Africa to the disappearing snows of Kilimanjaro implies that the impact of climate change will vary between and within nations. Nevertheless, determining the sub-regional impacts of climate change with any confidence is problematic.

A new foreign policy priority

The risk of security posed by climate change has attracted the world's political thoughts, creating a perceptible shift in the way that a growing number of decision-makers in the North and the South are speaking about the topic.

The African Union, in a January 2007 pronouncement, expressed grave concern about the susceptibility of Africa's "socio-economic and productive systems to climate change and variability and to the continent's poor mitigation and response dimensions" (African Union, 2007).

European Security Strategy records that climate change will heighten competition for natural resources, which likely increase conflict and migratory activities in various provinces (EU, 2003). In the interim, climate change has become a core foreign policy priority of many governments across the world, including the new administration's program in the United States, a move that is streamlined, at least in part by the security threat it poses.

1.1 Conflict

In general, the concept of CCCC reveals that climate change transforms resource base and therefore produce conflict ("competition") among people, nations and governments over land access, access to portable water, and other natural mineral resources. This is because the conditions of climate change, which up in stresses, strains, experiences, and showdowns will bring about groups in human connections levels. Understandings contrast, nonetheless, about whether such strivings will end in damaging savagery or valuable collaboration (Davies, 2003), and furthermore whether the primary wellsprings of contention and viciousness are environmental change related or political, and if political, what to do about them (Messer, 2010). While many tend to view all contention as a risk, struggle change experts frequently see strife as productive (Grover, 2008). The significance to socially productive strife is upkeep of common regard between the gatherings with the goal that they can progress in the direction of reasonable, commonly beneficial, peaceful changes of status and conditions. Strife itself is frequently very useful in human relations, driving individuals toward shared objectives, more noteworthy effectiveness, more prominent equity, and more prominent trust (Menzel, 2012). It is the damaging facets of conflict, for instance the verbal and physical manhandle of the gatherings, that is the most harming, and which makes a cycle of countering (Yassine-Hamdan

and Pearson, 2014). Intercession is required to break that cycle or winding of striking back. The procedures of peacebuilding are intended to dispense with ruinous components, and guide gatherings to helpful pathways, which incorporate compromise procedures of their own making (Gopin, 2009). Along these lines strife can be certain or negative in its effects, which may turn vicious—or not, contingent upon previous conditions, current settings, and viewpoints favouring hopelessness versus hopefulness (Mitchell, 2014). Unfortunately, the division of labour amongst "research" and "support" implies that few CCCC articulations report the climatic and political strides that move such clash prepare from word to deed, to threatening vibe or compromise, specifically circumstances (Messer, 2010).

This segment contends that climate change-induced migration can promote conflict in areas receiving migrants, the intensity of which may vary across scenarios (Reuveny, 2007). The process leading from migration to conflict works through four channels, which may act concurrently (Weill & Vitale, 2013). In this theoretical model, conflict is more likely when two or more of the following channels work together facing certain auxiliary circumstances.

1.2 Security

Security, occasionally defined negatively as the absence of threats (social, military, individual) or decidedly as the experience of different opportunities (especially flexibility from need and flexibility from fear) requires to be conceptualized at numerous levels. Conventional security concerns are "national" and concentrated on military readiness against political or common dangers, or their mix (Bush, 2009). Later security approach extends the idea of security dangers to consider the bigger domains of financial prosperity—access to nourishment, wellbeing, clean water and condition, and, since the 1980s, "a dangerous atmospheric deviation." Human security considers essential dangers to human life as far as individual common political and financial social-social human rights and flexibilities. These affinities incorporate opportunity from discretionary dangers of savagery and flexibility from unembellished financial hardships, defilements of which freely and reliantly undermine human prosperity and debilitate individual or gathering survival (Alkire, 2003). UN Development Program (UNDP) pioneers, starting in 1994, propelled this new calculated dialect and approach in their "Human Development Report 1994," to some degree to interface ecological change and maintainability issues to human rights and security inside this new integrating structure (Brauch, 2008). UNDP likewise presented

different related human improvement records, ascertained for every nation, which were then positioned in ensuing UNDP reports (Davies and Quinlivan, 2006). The meaning of "human security" presented by UNDP, and thusly cited in the Commission on Human Security report (which contributes the meaning of human security embraced by most political analysts), is: The insurance of the key center of all human lives in ways that improve human opportunity and human fulfillment. Making social, political, environmental, military, economic and cultural systems that collectively give people the building blocks of livelihood, survival and dignity.

Ethnic tension

When environmental migrants and inhabitants belong to different ethnic groups, the migration may promote pressure within groups. Residents may feel threatened, host countries may fear separatism, migrants may attempt to reunify with their home country, and residents may respond aggressively (Dalle, 2013). Circumstances involving long-standing ethnic disputes between migrants and residents are likely to be particularly prone to conflict which are often violent (Reuveny, 2008).

Competition

The influx of environmental migrants can drain the economic and resource base of the receiving area, encouraging native emigrant contest over resources. Burdens are expected to rise with the number of migrants and residents, mostly when resources are scarce in the receiving area and property rights are underdeveloped in regions. The additional demand for resources may also create lateral pressure, development of economic and political activities beyond the region's or state's borders so as to acquire resources, that increases the risk of conflicts (Onyango, 2013).

Distrust

Environmental movement may generate distrust between the area of the migration's origin and host region. For instance, the migrants' origin country may suspect that the receiving country accepts migrants in order to upset the ethnic balance in the source (Onyango, 2013). The government that is receiving may suspect that the origin seeks to penetrate the host, whereas the origin side may resent actual or perceived mistreatment of migrants by the receiving side (Vitalis Pemunta, & Brice Aristide, 2013).

Fault lines

The conflict possibly will also trail prevailing socioeconomic fault lines. For example, migrant pastoralists and resident farmers may compete over land, or migrants and residents may compete over jobs (Dalle, 2013). Additionally, migration from rural to urban areas is another fault line that presents competing effects (Gencer, 2013). Rebels could assemble poor and frustrated rural migrants to challenge the government, which may respond with force. However, urban settings may offer migrants more opportunities, defusing pressures (Kahl, 2006).

Auxiliary conditions

While advanced economies can absorb migrants in various sectors, underdeveloped economies, reliant on the environment for survival, are limited in this regard, mainly if their resources are rare (Castles, De Haas & Miller, 2013). Therefore, they are more prone to conflict due to the arrival of environmental migrants. Political instability and civil strife in the receiving area also increase the likelihood of conflict (Buhaug, Gleditsch, & Theisen, 2010). For example, migrants may join antagonizing groups or intensify the violence through any of the above channels.

It is apparent that the logic of this model applies to both climate change-induced and ordinary migration. What sets the former migration apart from the latter is its scope and speed (Parham, Waldock, Christophides, Hemming, Augusto, Evans & Lenhart, 2015).

When migration flows are small and slow, migrants can be absorbed more smoothly, lessening the likelihood of conflict (Fielding, 2011). Thus far, climate change has induced slow changes, but its effects are expected to include evermore frequent and intense droughts and storms (Campbell, Gullett, McNeill, Podesta, Ogden, Fuerth & Weitz, 2007). Quick changes of this type can push many to migrate quickly, especially when they depend on the environment for livelihood (Jónsson, 2010). In this case, the forces promoting conflict in the receiving area may be stronger, *ceteris paribus*. It should also be recalled that while causation in this model flows from migration to conflict, conflict itself can promote migration, including that from the receiving area itself (Simmons, 2010).

Recently, several observers revived the Malthusian paradigm, arguing that environmental problems cause conflict, particularly in LDCs. However, as discussed by Barnett and Adger (2007) and Han, O'Mahoney, & Paik, (2014), the issue is debated. Some scholars argue that these problems are not severe or that human ingenuity and innovation can alleviate them.

Others argue that it is resource abundance that causes conflict, not scarcity. These criticisms notwithstanding, as Diehl and Gleditsch (1998, 2001), Gleditsch (1997), McLaughlin Mitchell (2006) and others show, many scholars agree that environmental problems make conflict significantly more likely.

That said, this study do not argue that climate change-induced migration must lead to conflicts in receiving areas. In fact, migration can benefit absorbing areas in several ways, including increasing the workforce and tax-base, which can reduce the risk of conflict. As Gleditsch et al. (2007) note, governments may also assist in integrating migrants into society, providing, for example, financial aid, and alleviating distrust. However, we should not overrule the possibility of conflict. For instance, the influx of Darfur-Sudani environmental migrants in India led to violence in the eighties (Homer-Dixon, 1999; Kalbag, 1983). Tensions between internal migrants and residents in Darfur-Sudan turned into an insurgency in the 1980s and 1990s (Lee, 2001; Shelley, 1992). The absorption of the US Great Plains migrants in the 1930s was generally peaceful, but in California the migrants faced ugly slurs, beatings, and discrimination, their shacks were burned, and policemen were sent to block their entry to the state (Gregory, 1989; Worster, 1979). In an added extreme instance, the arrival of environmental migrants from El Salvador in Honduras eventually led to a war in 1969 between the two States (Durham, 1979).

Causal connections

Normal and (social, political, monetary) calculates communication are unmistakably demonstrated in any causal pathway including human experience of environmental change and strife (Barnett and Adger, 2007; Hsiang, Burke and Miguel, 2013; Raleigh and Urdal, 2007). However CCCC talk demonstrates an inclination for the previous over the last mentioned, as though reaction to catastrophic events and strengths were by one means or another simpler to face, and to prepare around, than political catastrophes, which truly have been similarly present in past ages of earth shattering and cataclysmic change (Brinkley, 1998). As will be appeared underneath in the discourse of appropriate issues, for example desertification, and on the off chance that studies, for example, Darfur, Sudan, atmosphere stressors in SSA have continually been ensnared in conflictual results where lack of democracy, poor governance, violent disregard of human rights as well as other political and administration components exist (Brainard, & Chollet, 2007). Hitherto for political reasons, it might be more hard to depict and ascribe interconnection to human-drove elements, for the most part where environmental

change turns into a reason for inaction or a clarification for disappointment fixing to terrible strategy guidelines (Strong, 2015). Likewise for scholarly reasons, people may

lean toward the "more straightforward" and all the more effortlessly quantifiable environmental change procedures and explanations over the far more complex analyses that involve complex political conspiracy and technical environmental maladministration (Messer, 2010).

2. Data Analysis and Interpretation of Results

Since the 1980, central African countries particularly Sudan has been a victim of series of civil wars which resulted from both political and environmental factors (Fukuda, Chiappa, Messineo, 2008). The country has been affected by civil war and conflict and for years and continues to create political tension and insecure, most particularly in areas which shares border with their southern counterpart South Sudan and in Darfur (Kasfir, 2005). In a Copenhagen climate summit of 2009, the UN Secretary-General Ban Ki-Moon and other leaders alluded to the fact that the root causes of the conflict in the capital of Sudan was specifically land degradation which shifts the attention of failures in political leadership although there are extra political Component play (Bar, 1997).

Officially known as the Republic of Sudan, the country Sudan is a country situated in the Northern Africa which is bordered by Egypt to the north, the Red Sea, Ethiopia and Eritrea to the east, southward is South Sudan, the Central African Republic to the southwest, west is Chad and Libya to the northwest. Sudan is also the third largest country in Africa and the River Nile divides the country into eastern and western halves (www.nationsonline.org). Before the Sudanese Civil War, South Sudan was part of Sudan but broke away and gained independence in 2011. The country is also predominantly Islamic religion. Sudan, was at one time the biggest and a standout amongst the most to pographically different states in Africa, part into two nations in July 2011 after the general population of the south voted in favor of freedom (<https://en.wikipedia.org/wiki/Sudan>).



Figure 1: Sudan country profile

Source: (BBC Africa)

However, there are various outstanding issues to be settled between the two countries most the share of oil revenues and the how to exactly demarcate their border because it continues to create tensions between the two Sudanese states (www.bbc.com/news/world-africa). Conflict has besieged Sudan for quite a long time which has cost the lives of about 1.5 million people from the two rounds of north-south civil war (www.bbc.com/news/world-africa). There is also a continuing conflict in the country's western region of the capital Darfur which has caused approximately two million people to leave their homes and 200,000 people killed (www.bbc.com/news/world-africa).

2.0. Climate change and Conflict in Sudan's Darfur

According to a UN report, the conflict in Darfur-Sudan occurred as a result of climate change and degradation of the environment, which expert says can cause another serious conflict across Africa unless measures are put in place to curb this problem. The investigation by the UN into the relationship between climate and conflict in Sudan estimates that the effect of climate change on how stable the country can become is more likely to go beyond the borders. Some of the findings was that crop yields could drop up to by 70% in some of the most deprived areas of the Sahel in Sudan.

In 2003, the conflict which broke in Darfur and caused an estimated death of about 200000 was reportedly caused by a regional rebellion but the UN investigations report contradicts. The report found that the conflict was rather caused by the inability of rains to drop and the creeping desertification. The following are some of the findings of the report by the UN:

- *The desert in northern Sudan has advanced southwards by 60 miles over the past 40 years;*
- *Rainfall has dropped by 16%-30%;*
- *Climate models for the region suggest a rise of between 0.5C and 1.5C between 2030 and 2060;*
- *Yields in the local staple, sorghum, could drop by 70%.*

Climate change condition in Sudan

This section deals with first the relationship between climate change and the effect of climate change on resources and natural disasters. To start with, this study explores the historical development of the climate in Darfur-Sudan. This analysis entails the change in temperature, change of precipitation, sea rise level, and mega events in Darfur-Sudan (Fig. 2).

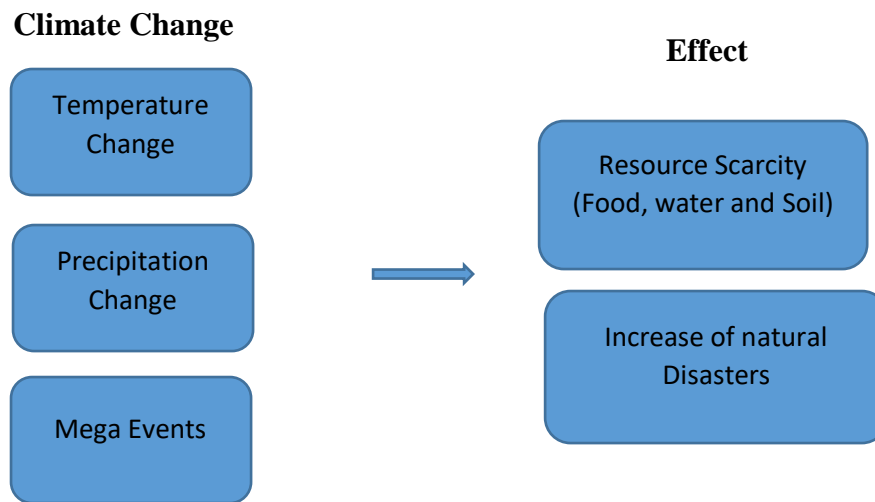


Figure 2: Climate change and effects

Source: Adopted from WBGU (2007).

Temperature change

Fig. 3 shows the average temperature changes in Sudan in the four seasons for the period from 1950 until 2005. Unfortunately, the datasets from the Sudan Meteorological Department (SMD) were not available. Analysis is conducted using images of figure 5.2. Temperatures changes highly from year to year in Sudan. Based on the figure below, it seems there is a rise in average temperatures in one and other seasons during the last fifty years. The average rainy season temperature has been quite stable. The average pre-hammatan season temperature has declined.

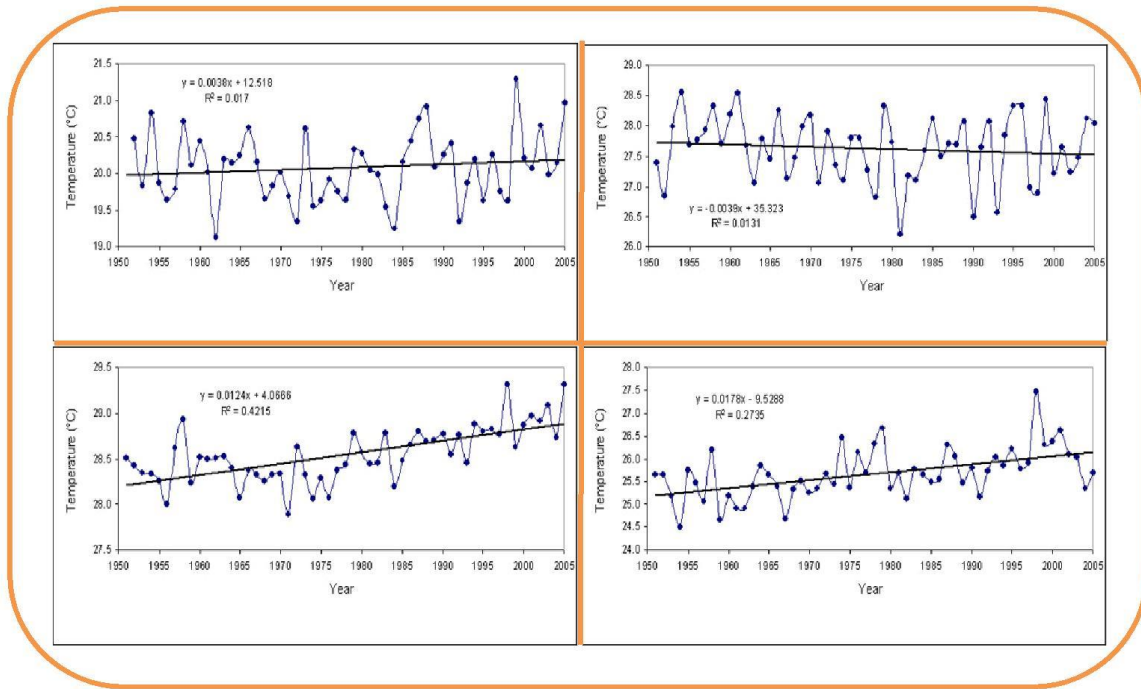


Figure 3: Average temperature change Sudan

Source: Sudan Meteorological Department (SMD)

Precipitation change

The Fig. 4 below illustrates the average rainfall in Sudan in their regular 4 seasons for the period from 1950 until 2005. This study adopted from a 2009 report of the International Union for Conservation of Nature (IUCN). Rainfall kept changing highly from year to year in Sudan. Based on the images, there appears no significant change in average annual rainfall over the last decade.

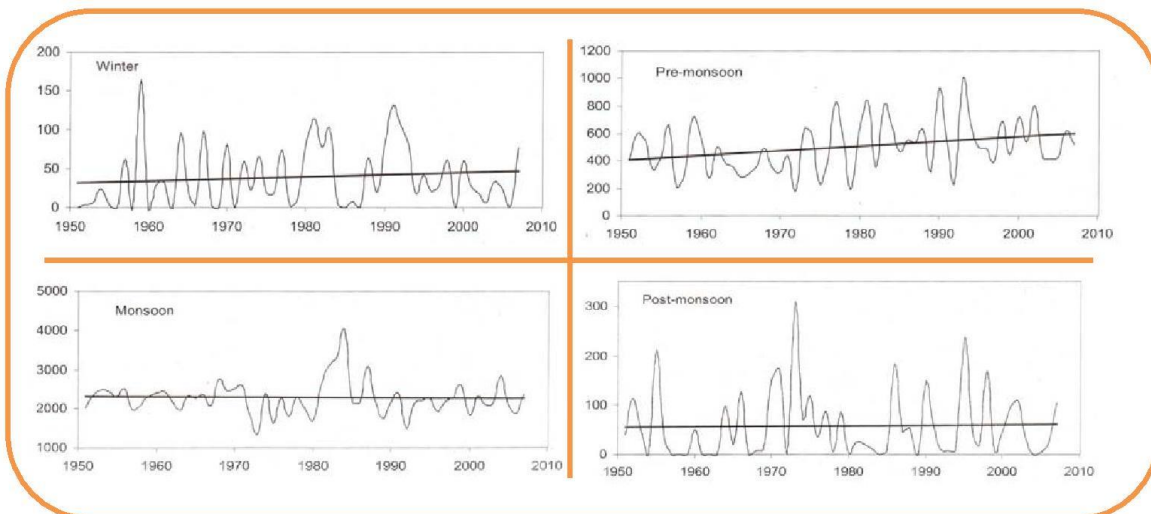


Figure 4: Average rainfall in Sudan

Source: International Union for Conservation of Nature (IUCN)

Mega events

In Darfur-Sudan there has been an increase in the number of floods. Fig. 5 shows the number of floods in Sudan in the period of 1970 until 2008. Fig. 5 shows an increase of the average annual number of floods in Sudan from one to three, between 1970 and 2008.

Figure 4.4: Number of floods in Sudan

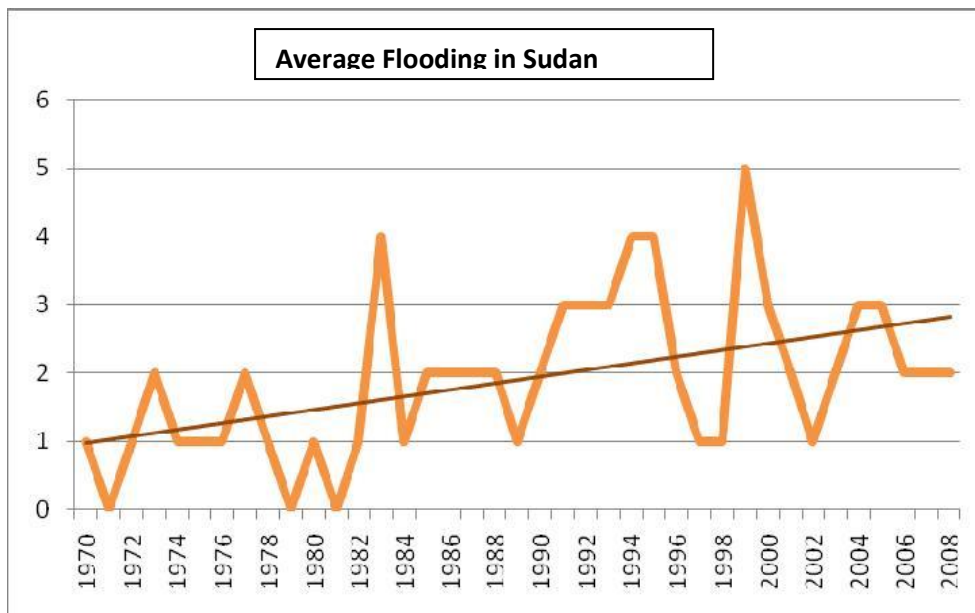


Figure 5: Number of floods in Sudan

Source: EM-DAT, The International Disaster Database, Centre for Research on the Epidemiology of Disasters (CRED)

The climate condition in Sudan has been changing over last 40 years where temperatures have risen in the hamattan and post-hamattan seasons. On the average, rainy season temperature has remained quite stable whilst the pre-hamattan season temperature has been declining. Evidence shows that temperature has risen globally. There seems to be no significant change in average annual rainfall over the last 40 years.

Effect of climate change on Natural Resources

This section of the thesis analyses the relationship that exist between climate change and the scarcity of resources in Sudan. Has a change of climate effect on the availability of resources like food, freshwater and agricultural land? The aim is to find a relation between climate change and scarcity of resources.

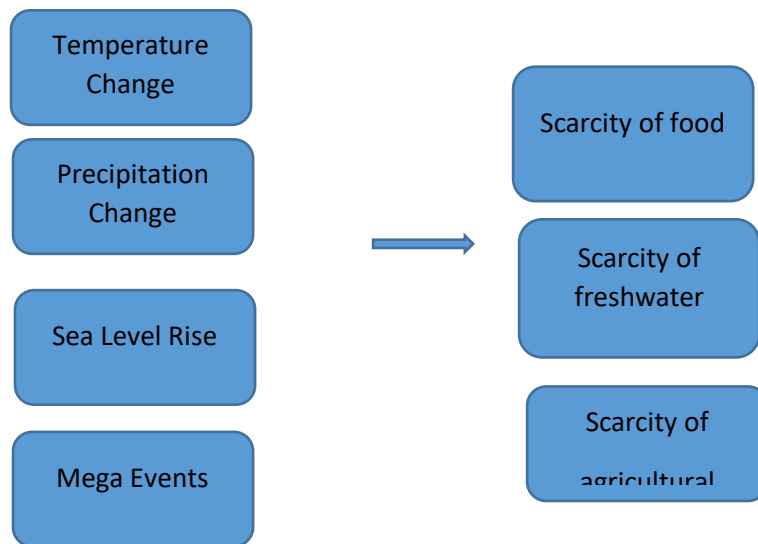


Figure 6: Effect of climate change on Natural Resources

Source: Adopted from WBGU (2007)

This thesis suggests that there exists a relationship between climate change and the availability of food, freshwater, and agricultural land in Sudan Paragraph 5.1 shows that the climate in Sudan has changed for the past 40 years. To verify this statement, there should be a decrease of food, freshwater and agricultural land.

Scarcity of food

Food availability in Sudan, is analysed by looking at the food production- and crop production indexes. The food and crop production indexes are the indicators for the ‘scarcity of food’. The figure below indicates the food and crop production indexes for Sudan for the period of 1970 until 2005. The Food production index also covers food crops that are edible in nature and that contain nutrients. Also, the Crop production index indicates agricultural production for each year relative to the base period 1999-2001.

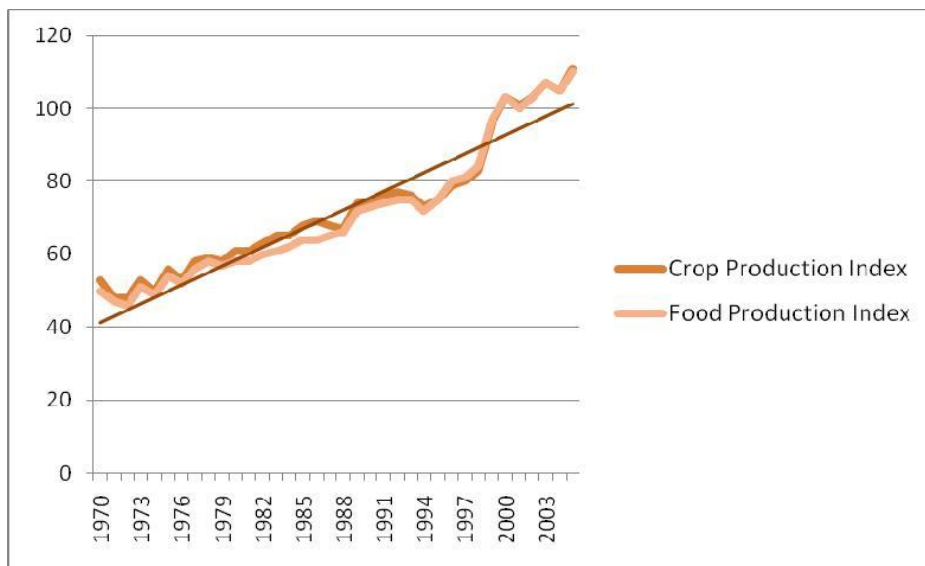


Figure 7: Food and Crop Production Index

Source: Sudan Meteorological Department (SMD)

The figure shows that production of food as well as production of crops have increased in Sudan from 1970 until 2005. In this period of time the temperature has also risen in Sudan. There is a strong relationship between the temperature condition and the food production index and the crop production index. This suggests that there is a positive relation between these variables. The rise in temperature causes the food and crop production increases in Sudan. The study did not find any correlation between the floods and the food production index or the crop production index. Based on these indicators the study can conclude that there is no relationship between the increasing number of floods and the production of food and crops.

Scarcity of freshwater

This part of the thesis compares the climate change indicators used with the freshwater availability. There is a relationship that exist between the climate change indicators and the freshwater availability. The data regarding freshwater resources in Darfur-Sudan is limited. Tab. 1 below shows the renewable internal freshwater resources in Darfur-Sudan.

Table 1: Renewable internal freshwater resources

Year	Renewable internal freshwater resources (cubic meter)	Renewable internal freshwater resources per capita (cubic meters)
1972	105 billion	1.440
1977	105 billion	1.259
1982	105 billion	1.101
1987	105 billion	972
1992	105 billion	870
1997	105 billion	789
2002	105 billion	720
2007	105 billion	666

Source: Aquastat Database Query, Food and Agricultural organization of the United Nations (FAO)

There appears no relationship between the change of climate and the availability of freshwater. Per capita freshwater resources have decreased since 1972. It is more likely that this is caused by a growing population in Darfur. There is no relation between climate change and a growing population. Based on the available data, there is no link between climate change and scarcity of freshwater resources.

Scarcity of agricultural land

According to the World Bank a rise of the sea level of one-metre would swallow about 17 percent of the of Darfur-Sudan's land area, where about 20 million people live today (Worldbank, 2000). According to the International Union for Conservation of Nature (IUCN), one of the leading environmental organizations in Darfur-Sudan, this estimate is misleading because it doesn't factor in the embankments that protect much of the coast (IUCN, 2009).

In this paragraph we explore the relationship between the climate change indicators and the availability of agricultural land. Darfur-Sudan is gaining land, but no all land is arable. Agricultural land refers to the share of land area that is arable, with permanent crops and with permanent pastures.

Hypothesis 1 suggests that there is a relation between climate change and the scarcity of resources like food, freshwater and agricultural land.

Effect of climate change and social effects

According to the conceptual framework the consequences of climate change can have social effects like political instability, economic instability and migration. The next step is to analyse the relationship between the consequences of climate change (scarcity of resources and an increase of natural disasters) and the social effects.

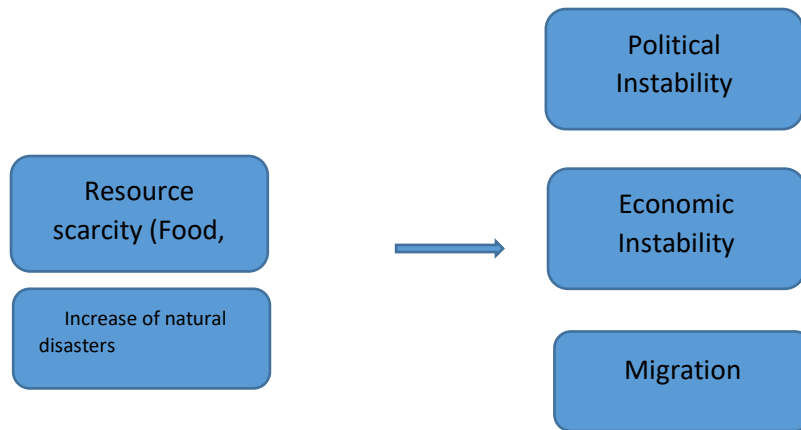


Figure 8: Effect of Climate Change and Social Effect

Source: Adopted from WBGU (2007)

2.1 SECURITY

The consequences of climate change, scarcity of resources and an increase of natural disasters could have an effect on the political stability in Darfur-Sudan.

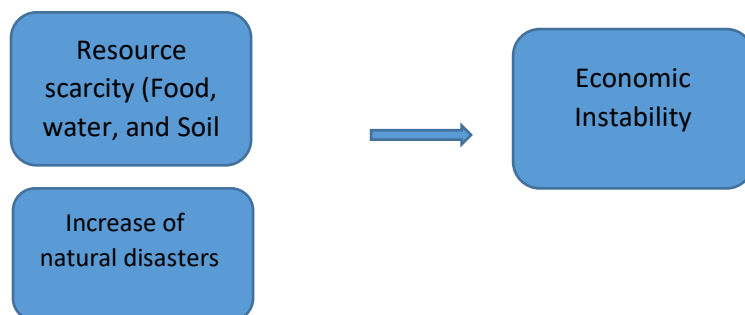


Figure 9: Political instability

Source: Adopted from WBGU (2007)

Political situation Darfur-Sudan

Since attaining independence in 1956, the country Sudan has experienced series of civil wars in different parts of the country. Conflict experts has attributed the country's protracted conflicts to reasons such as cultural, environmental, political, economic religious and others (Hyden, 2012). A Peace Agreement which was signed in the year 2005, led to the independence of South Sudan in 2011 but it has had little effect and significance of the remaining conflict regions in Sudan because the substance in the agreement was not implemented, and violent conflict persists (Temin & Woocher, 2012).

Tensions continue to brew between Sudan and South Sudan, due to the fact that there are still unresolved issues regarding border issues and oil (www.insightonconflict.org). The conflict in Sudan has led to a serious perpetration of violations of human rights, crimes against humanity and severe humanitarian crises in the country's Southern region, like Darfur, South Kordofan and Blue Nile regions (www.insightonconflict.org).

There are other scholars who also believe Sudan's conflicts emanated as a result of the creation of the state (Kagan, 2009). In the time of the Sudanese Anglo-Egyptian colonial rule, the Muslim in the south and the Christians who are based in the south were ruled as two different states (Natsios, 2012). They developed the north but refused to help the south, and this created parallel entities which overlooked the diversity and historical interrelations between the areas (www.insightonconflict.org).

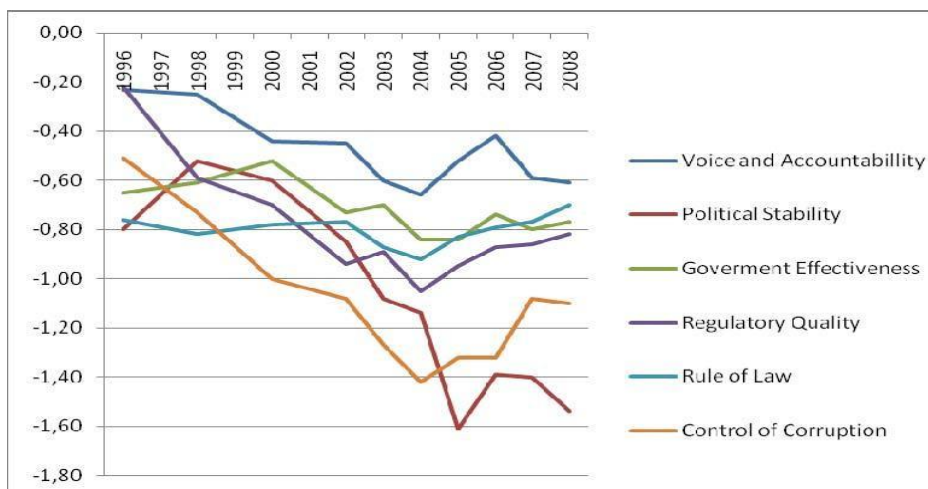


Figure 10: Worldwide Governance Indicators (WGI) Darfur-Sudan

Source: Worldwide Governance Indicators, World Bank, 2009

According to the WGI 's of the World Bank the political stability of Darfur-Sudan has decreased since 1998.

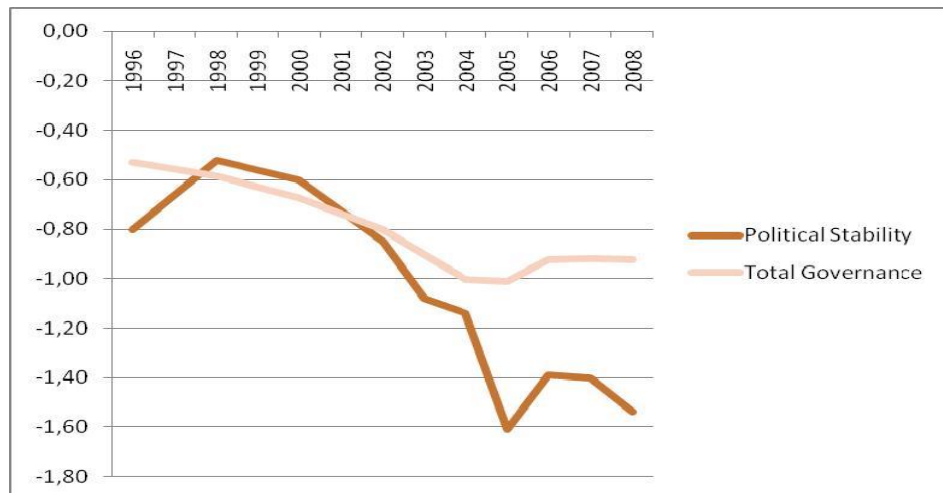


Figure 11: Political stability Darfur-Sudan

Source: Worldwide Governance Indicators, World Bank, 2009

Economic situation in Darfur-Sudan

Darfur-Sudan is one of the world’s most densely populated and poorest countries of the World.

In 2005, approximately 40 percent of the people lived below the poverty line

The effect of climate change also has an effect on the economic stability in Darfur-Sudan.

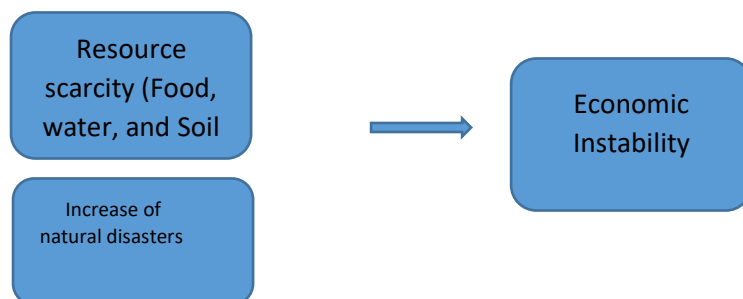


Figure 12: Economic instability

Source: Adopted from WBGU (2007)

Table 2: Percentage of population living below the poverty line

Year	Percentage of population living below the poverty line
2005	40.0%
2000	49.0%
1996	51.0%

Source: World Development Indicators, 2009 (World Bank), DPP Quick Query

The first Sudanese civil war broke up in 1955, due to tensions which flared up and led to the outbreak (Grawert, 2008). This conflict was characterised by successive coups and changes in regime, but in 1972, an agreement was signed in Addis Ababa to end the conflict and another promise of political autonomy for the South was given (www.insightonconflict.org). In spite of this, another conflict broke up in 1979 due to the discovery of oil in the southern part of the country and this led to the decision by the then President Nimeiry to implement in full force the Islamic Sharia law for the whole of Sudan, and it also created another civil violence in 1983 (www.insightonconflict.org).

In the same year, the Sudan People's Liberation Movement/Army (SPLM/A) was formed by a man from the southern part of the country called John Garang purposely to fight for a secular in Sudan (www.insightonconflict.org). President Nimeiry was removed from in 1986 via another coup and a general elections was conducted to elect a replacement in the person of Sadiq Al-Mahdi (www.insightonconflict.org). This new president also gave his military the free will and the authority to kill, rape and enslave the southern populace (www.insightonconflict.org).

It didn't take long and a severe famine struck Sudan in 1988 through the conflict and ended the lives of an estimated 250,000 people (www.insightonconflict.org). This conflict coupled with famine led to the death of about 2 million people, which displaced also about 4 million were displaced (www.insightonconflict.org). Omar al-Bashir became the country's next leader through a coup in 1989 and the situation increased to worth (www.insightonconflict.org).

Indicators for the economic situation in Darfur-Sudan are the Gross Domestic Product per and the Capita Gross Domestic Product (GDP)

Figure 4.8 Gross Domestic Product Darfur-Sudan



Figure 13: Gross Domestic Product Darfur-Sudan

Source: Worldwide Governance Indicators, World Bank, 2009

The Gross Domestic Product is the whole of significant worth included by every single inhabitant maker in addition to any item assesses (short sponsorships) excluded in the valuation of yield in addition to net receipts of essential salary (pay of representatives and property pay) from abroad. The GDP of Darfur-Sudan has increased since 1970s. Fig. 13 shows the GDP of Darfur-Sudan from 1970 until 2007.

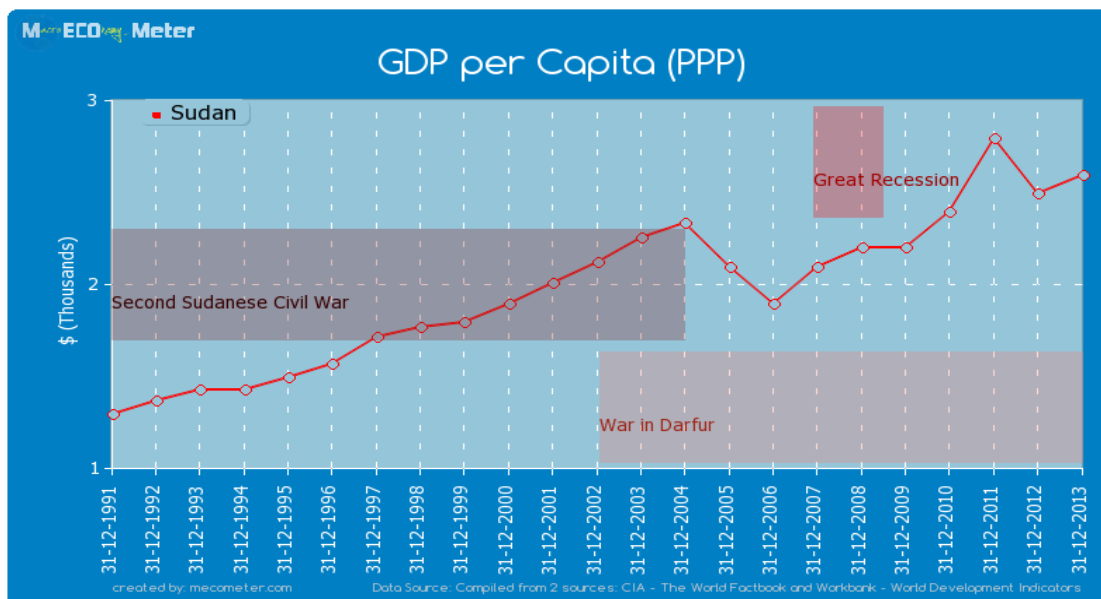


Figure 14: Gross Domestic Product per Capita

Source: Worldwide Governance Indicators, World Bank, 2009

The GDP per capita show a similar pattern as the GDP. Since 1970 the GDP per capita has increased. The figure above indicates that the development of the GDP per capita in Darfur-Sudan.

Migration flows in Darfur-Sudan

There are two types of migration:

- Internally displaced persons (IDP)
- Economic migrants

An internally displaced person is someone living in situations of internal displacement as a result of conflicts or human rights violations. According to the Internal Displacement Monitoring Centre (IDMC) in 2000, between 60,000 and 500,000 people are internally displaced in Darfur-Sudan. As the conflict escalated, the Darfur-Sudan government began relocating poor and landless area (approximately 400,000) from the plains to the CHT between 1979 and 1983. The effect of climate change, scarcity of resources and an increase of natural disasters could also have an effect on the migration flows in Darfur-Sudan.

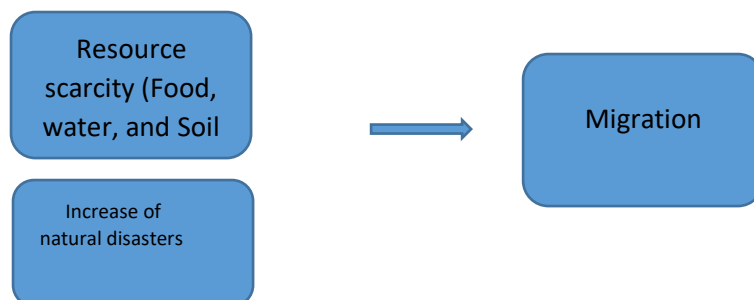


Figure 15: Migration

Source: Adopted from WBGU (2007).

Table 3: Net migration Darfur-Sudan

Year	Net Migration
1970	-87,335
1975	-87,335
1980	-300,100
1985	-380,050
1990	-434,000
1995	-500,080
2000	-550,080
2007	-700,0800

Source: World Development Indicators (2009), DPP Quick Query

Further Analysis of Sudan conflict as climate change

As described above, the fall out of an examination conducted into the Sudanese ecological system, points out that that most of the lands in the country is now very vulnerable. This is because the country is now experiencing drought in about some areas of the country, particularly in the rural areas where more than 65% of the population lives. On average the reported annual temperature in the country falls between 26° to 32° where sometimes can hit up to 47° C which is causing severe stresses and other heat related diseases. The unpredictable pattern of rainfall is causing a lot of problems from the North to the South in Sudan. Rainfall is now unreliable which is severely affecting rain-fed agriculture in the country. There is a continues drought condition in Sudan because of an annual decrease in rainfall in the last 60 years (0.5%) in some parts of the country. This issue has caused a serious and a long-standing drought in Sudan. A typical example is when the country experienced a continues drought from 1978 to 1987 which caused severe problems for social and other problems including many human and livestock animals as well as migration and displacement of several people living in the county.

The country has also experienced severe flooding over the past years in two different kinds. The first type of flooding in Sudan occurred during a heavy rain water overflow the Nile River and its banks. The other type of flood in Sudan occurred as a result of heavy rainfall during the sunny period season and such incidents were reported in 1952, 1962, 1965, 1978-1979, 1988 and 1997. Additionally, drought and floods there are other climate extreme events such as thunderstorms and heat waves whose occurrence though less frequent, dust storms, still pose serious threat to local sources of revenue.

Aside the adverse economic impacts of these climate change related phenomena there are also associated social influences. For instance, during drought events conflicts occur due to competition over diminished natural resources. Similarly - as has happened many times - food shortages lead to famine, followed by displacement and refugees which in turn leads to misappropriation of the natural resources that exist. Throughout floods and droughts people typically move to cities where their arrival causes stress and shortages of already inadequate amenities. The displaced as well live in very severe conditions that can lead to disturbances that undermine security and stability.

Non-climatic conditions also contribute to increased vulnerability, particularly in rural areas and local societies. Researches from the preparation of the Sudan National Program of Action (NAPA) confirm that in five states representative of the country's five ecological zones non climatic factors that increased vulnerability comprised: lack of income diversity, deep poverty, lack of agricultural inputs, increased cultivation, resource mismanagement, fragile land and water resources, natural resource conflicts, poor soil fertility, deforestation, poor extension services, community displacement as well as poor sanitation and health services.

Mainly in the aftermath of Hurricane Katrina, well-placed environmental journalists, for example Faris with no first-hand expert knowledge of the geographic/political/ethnic/religious (PGER) factors underlying the conflict, vehemently asserted that the "roots" of the Darfur conflict lie in climate change conditions (Faris, 2007). By contrast, for those who do have close knowledge of the Darfur conflict, climate, and politics (eg. Waal, 2007), political factors always take precedence over climate change, although shrinking access to grazable and cultivatable land, which pits herders against farmers, is always implicated

So also, an UN Environment Program (UNEP) certainty discovering group sent to Darfur was mindful so as to qualify its natural attributions in its 2007 report, "Sudan Post-Conflict Environmental Assessment," connecting natural disintegration variables to viciousness in a minority of locales and cases: "These linkages do exist yet their criticalness and geographic scale ought not be overstated (UNDP report, 2007)." The UNEP proclamation archives that

land utilize encounters have been wellsprings of contention and viciousness in Darfur for no less than seventy years. Be that as it may, until 1970, neighborhood debate determination systems figured out how to contain them. Deplorably, the state-building process dispensed with these nearby legitimate structures yet did not substitute them. What's more, national (northern government versus southern Sudan) common war and local (Ethiopia, Chad, Somalia, Uganda, Libya) clashes made brutal employments with little arms a development industry and occupation. Accordingly, these nearby clashes have not been contained; in actuality, they have scaled up in power, particularly with help from outer funders.

Nation wide, ponder government arrangements favoring development of flooded (automated) horticulture in struggle inclined ranges has drawn down the land zone accessible for customary cultivating furthermore, crowding and exacerbated strains amongst cultivating and grouping gatherings. Once more, environmental change adds to this deadly blend, as "fizzled" pastoralists fall casualty to drought and land degradation. It is not the prime cause however, government policy is, although neither is the major factor spearheading the case of conflict in Darfur, that is motivated by government politics and PGER influences.

On account of Darfur, strife likewise adds to these harming results, generally related with "environmental change," both straightforwardly and in a roundabout way. Over the previous decade, soldiers purposely directed and pulverized water foundation, making settlements dreadful because of "water shortage." Combatants likewise intentionally chopped down trees and obliterated fields and fields—as part of "seared earth" techniques that prevailing with regards to pushing inhabitant populaces away—so previous occupants couldn't return. UNEP's Darfur appraisal groups additionally watched uncontrolled logging, moreover associated with the breakdown in expert and govern of law. Results of the managed effects of war economies are underinvestment in ecological assets and their administration in addition to destitution, poverty, that drive people to degrade resources more, as firewood cutting and charcoal production, that contribute to deforestation and desertification, develop new livelihood prospects. Seeing and translating such proof of natural annihilation, UNEP had effectively deduced in a 2004 evaluation that desertification was the aftereffect of cultivating and grouping, and in addition displaced person exercises.

These man-made reasons for natural and social pulverization unmistakably have intricate causes and human rights implications that tend to get oversimplified in blogosphere postings. For instance, one Worldwatch Institute posting states:

Giving to a 2004 UNEP evaluation, the shortage of water and ripe land in Darfur has long been a wellspring of contention amongst agriculturists and itinerant vagrant gatherings. Around

2003, developing asset pressures and social, ethnic and religious contrasts set off a revolt by revolt gatherings, exasperating an administration crackdown that has brought about across the board savagery and the passings of an expected 450,000 individuals as per reports. In a May 5 address at The George Washington College in Washington, DC, UN Secretary-General Kofi Annan focused on the requirement for worldwide collaboration to help the general population of Darfur, whose rights as people have been disregarded in the most horrifying way.

Verifiably, steers brushing and cultivating have been among the main sources of desertification in Darfur, regardless now displaced person camps too are adding to the loss of officially uncommon vegetation in these areas. Relatives, who rely on upon kindling to cook their nourishment, are being constrained to wander more remote from the camps to discover scanty fuel, driving them at more serious hazard for assault by the administration supported Janjaweed local army. To enhance conditions, Refugees International, a helpful help association, remains preparing displaced people in the development of fuel-proficient stoves produced using water, earth, and grass or creature waste, which diminishes the quantity of outings into perilous territories and stems fuelwood related desertification. Moreover, UNEP proposes making more choices for employments inside exile camps, for example, ability building and setting up a wage work framework for camp administration exercises. On a greater scale, UNEP bolsters safeguarding vegetation, receiving natural cultivating systems, planting trees and gathering water to anticipate desertification or vegetation misfortune. For this situation, the "issue" to be understood is absence of fuel, which Refugees International, a compassionate nongovernmental association (NGO), is attempting to "settle" with additional fuel-productive stoves. Another "issue" is vocations in the displaced person camps, which UNEP is proposing to understand by expertise assembling and paying displaced people for work in camp administration. As per this blog, UNEP likewise affirms "stupendous arrangements" for supportable natural administration. Another proposed "arrangement," this opportunity to the "water shortage" issue all the more by and large, includes boring into a tremendous underground aquifer as a wellspring of new water. This hydrological depiction of the issue and its answer reacts to the judgment skills comprehension of the circumstance in the Sudan locale, the expected breadbasket of the Middle East, which is that the land is drying out. Likewise, desertification that is bringing about an expansion in showdowns and brutality between ranchers furthermore, herders. In this structure, some demand the arrangement is to discover new wellsprings of water. However, then again given the political-monetary setting, water won't end clashes, and could make more. On the off chance that government is the test or on the other hand absence of government activity is the test, just distinguishing an

underground lake is not the arrangement. A more critical arrangement of arrangements must be to modify water foundation as ventures on the ground toward peace, keeping in mind the end goal to discover approaches to arrange commonplace and neighborhood control over assets availability and to increase government investments in the Darfur region, between other provinces.

In a 2007 blog posting, alluding to a particular and extensive UNEP report, World watch states: In Sudan's Darfur area, severe seared earth strategies by migrant civilian armies and government armed force units have murdered no less than 200,000 individuals and constrained 2.5 million out of their homes since 2003. Ceasing the mass savagery has turned into a mobilizing weep for some who contend that there is a requirement for "compassionate intercession." The Enough Project, for example, requires an approach that blends peace-production, insurance, and discipline of culprits of mass savagery. The refinement to such clearing requests, in any case, transactions have concentrated on shoring up a powerless African Union mission by conveying a "half breed" African Union/UN peacekeeping troops. While Darfur demonstrates the cut off points of current peacekeeping and philanthropic arrangement, it is likewise getting to be clear that the underlying foundations of contention are not found in the frequently rehashed claim of shortsighted "ethnic abhorrences". To a huge degree, the contention there is the consequence of a moderate onset catastrophe—crawling desertification and extreme dry seasons that have prompted nourishment weakness and sporadic starvation, too as developing rivalry for land and water. The Sudan Post-Conflict Environmental Assessment—another report by the UN Environment Program (UNEP)—contends that serious ecological debasement is among the main drivers of the contention... .

- Deserts have spread southwards by a normal of 100 kilometers in the course of recent decades.
- Arrive debasement is connected with overgrazing of delicate soils. The amount of animals has detonated from near 27 million creatures to around 135 million.
- A "deforestation emergency" has prompted lost very nearly 12 percent of Sudan's woods cover in only 15 years, and a few regions may lose their staying woodland cover inside the following decade.
- Breaking down and exceptionally unpredictable examples of precipitation in parts of the nation—especially in Kordofan and Darfur states—gives mounting

confirmation of long haul local environmental change. In Northern Darfur, precipitation has fallen by a third in the previous quite a while.

Achim Steiner, official chief of the organization, cautions that "Sudan's catastrophe is not quite recently the awfulness of one nation in Africa — it is a window to a more extensive world highlighting how issues, for example, excessive exhaustion of characteristic assets like soils and woodlands united to effects like environmental change can destabilize groups, even whole nations.

As of not long ago its need concentrate on ecological debasement as the main driver, this blog posting misses the not-so-unobtrusive but rather substantive UNEP contentions that political components, in particular the administration of Sudan's deliberate viciousness, what's more with genuine absence of control over natural administration are the most imperative underlying drivers and supporters of desertification, overgrazing of delicate soils and the "deforestation emergency" brought on by such political maladministration.

Mindful perusing of the UNEP report proposes that in this contention, more fuel-efficient stoves or considerably another great wellspring of water (the new underground aquifer) won't understand the circumstance. Or maybe, it is the political-economy related with war, with its viciousness, disorder, neediness, and absence of interest in present and future assets, which, in unlimited cycles, is the "main driver" of contention. Under these conditions, the UNEP group's suggestions fall in the field of land-utilize arrangement change, which are additionally a type of atmosphere moderation.

Cautious perusing of UNEP's unique review uncovers that the specialists tie the different segments of ecological emergency to disappointments in natural administration, placing, "Among the main drivers of many years of social strife and struggle are the quickly disintegrating natural administrations." These administrations incorporate interest in ecological administration, including atmosphere adjustment measures; limit working of national and nearby government in natural undertakings and the fuse of natural calculates all UN alleviation and improvement extends and in addition ventures.

The report itself, in section 4 ("Conflict") segment 3 ("Analysis of the Role of Natural Resources as a Contributing Cause of Conflict") recognizes that numerous non-ecological (PGER) components have brought on strife in Darfur, as in different parts of Sudan, and

ecological administration ought to be seen as a contributing element, not a root figure. Having introduced this proviso, the report's creators then unequivocally disregard non-ecological figures their investigation of characteristic asset calculates as reasons for struggle: oil/flammable gas, Nile waters timber, and farming and peaceful land and water utilize. The review presumes that somewhat unobtrusive ventures of \$120 million more than four to five years could help areas and the country adjust to and relieve ecological stressors. This little portion of Sudan's yearly take from its oil riches is by the by challenged, in light of the fact that peace assertions have not yet settled components for observing oil pay.

The 2007 World watch blog provides some adjust, ensnaring the administration of Sudan and furthermore conditions in encompassing nations:

Sudan Environment Conservation Society articulates that average annual rainfall in El Fasher in northern Darfur has dropped nearly in half since 1997 when first data gathered. Meanwhile, Darfur's population and with it, pressure on the land has grown six-fold over the past four decades, to about 6.5 million.

Asset troubles may have impelled collaboration between Darfur's cultivating and roaming social orders. The two populaces have both a past filled with going after rare water and fruitful land, additionally a record of monetary relationship and a convention of looking for arranged arrangements. By the by, infringing deserts have pushed travelers advance south and into developing clash with cultivating groups. Expanding shortage has prompted rising tribal enmity in the course of recent decades.

Darfur has likewise seen expanded banditry and wilderness, and it has played automatic host to guerilla bunches from neighboring Chad district. Many years of monetary and political disregard by the focal government in Khartoum at long last prompted resistance in February 2003. The Sudanese government answered by playing up ethnic refinements and outfitting the alleged Janjaweed migrant guerrillas. Both natural rebuilding and compromise between various groups are critical. What's more, those determined off their property by the contention should be either permitted back home or resettled in economical social orders. Evacuee camps in Sudan and neighboring Chad themselves are adding to extra natural debasement: the uprooted have minimal decision however to chop down trees for kindling, or to exhaust the little underground water there is.

Extra sources referred to by auxiliary or tertiary sources (e.g., Seed Magazine—"A Hostile Climate"¹⁷⁷), incorporate the US and UK military and Human Rights Watch and different NGOs. In this Seed account, the "peace suggestions" of environmental change fluctuate. For instance, British Home Secretary John Reid opined: "The limit truth is that the absence of water

and farming area is a critical contributory variable to the heartbreaking clash we see unfurling in Darfur. We ought to consider this to be a notice sign." 179 But such analyses hold back before a proposed plan of activity accordingly. Human Rights Watch, which did not stop at "asset wars," faulted the human-rights-damaging government for not setting up water administration and dissemination frameworks to avoid strife and guarantee essential human rights are met. Klare included the upwardly portable shopper's way of life, which diminishes assets for poorer individuals in distant spots. Be that as it may, of course in Darfur, an extra danger is the infringing desert. None of these is a direct record or direct chronicled review.

By contrast, two Feinstein International Center researchers and their colleagues, who have worked closely with drought-afflicted populations over the past 25 years, suggest a more nuanced account that blames politics much more than the weather. These accounts of Darfurian livelihoods over the past decade implicate political ecology, which is not the same as blaming drought, desertification, or other markers of "climate change." This research additionally finds that there are no good data on conflict dynamic aspects. Darfur, traditionally a surplus-grain-producing area, self-sufficient in food, now must rely on food aid, mainly sorghum, although local millet is still preferred, to feed humans and livestock. Displaced populations and lack of security have greatly reduced farming, even though people continue to clear land of acacia trees to sow cereals and related crops. Cereal markets, where traditional supplies have been severely damaged by fighting, continue to function by selling food aid, which has been looted or sold, while farmers who grew traditional cash crops: peanuts, gum arabic, tobacco, and oranges have had to adjust to the conditions of violence, suggesting that sellers pay protection money and use more circuitous paths to market and livestock is moved in smaller numbers over longer route options. Trees have been cut, reducing gum Arabic, to fuel timber mills, which supply wood to meet the demand of the ever-enlarging aid community. The government is responsible in regulating such operations, nonetheless it has totally crashed or collapsed. In recent framework, the poor 2007–2008 harvests were blamed on inadequate rains, locusts as well as weaverbird infestations, nonetheless the authors view the larger political economy as the foremost hazard. They suggest that food-chain analysis would be the most fruitful approach to understanding food wars in Darfur: Look at individual crops, who controls them at each level, and how each level is affected by conflict. They also suggest better credit and processing facilities to improve livelihoods of the affected.

De Waal, who has worked in Darfur since the mid 1980s and lived there with local people amid the 1983–1984 dry spell (see de Waal183), sees political-economy and the administration's activities/inactions as more huge than asset shortage as such. He and partners affirm that the

logical proof base is inadequate; they propose that the circumstance of Sudan should be considered with regards to warming and drying patterns over the Sahel. They distinguish additionally that land-utilize examples are in charge of a great part of the watched disability. In Darfur, the UNEP appraisal group notices malevolent cutting of mango trees, intended to evacuate all cases of earlier tenants to the land and to ensure that they don't return. The cutting timber for constructional purposes and kindling likewise adds to desertification and deforestation. Overgrazing adds to annihilation of vegetation and soil breakdown. De Waal warily surveys the authentic confirmation against a foundation of intuitive atmosphere and political unrest.

A moment element is populace development, which quickens inclines in natural botch. As populace develops forcefully, by basic number juggling more individuals are influenced by the expansion. De Waal likewise makes the intriguing point that in the event that one measurement of the Malthusian worldview is starvation as an amendment for overpopulation, this has here and now pertinence in the Darfur circumstance, where populace has bounced back from starvation related passings in 1984–1985 and low rates of birth. By 2003, populace had developed from 1.3 million at Sudanese autonomy (1956) to 6 million, which was twofold the populace in 1984. In any case, there was no practically identical interest in farming innovation and foundation to raise sustenance generation and security of the area. The main major innovative change was agriculturists fencing property where they had diesel pumps for water system.

- This provoked de Waal to propose that political-monetary elements lie at the base of the savage clash in Africa. No administration ventures, and no administration reaction to starvation, put Darfur on an impact course with the legislature. Monetary actuations for savagery among resource poor youth, influenced by political viciousness, assaults by tribal guerrillas (1985–1986), Chadian state armies (furnished by Libyans), and afterward government-helped brutality associated with the Janjaweed, by which time one and all had programmed weaponry, created boundless pulverization, death toll and occupation and relocations toward the south. Chadian camel wanderers continue being a noteworthy wellspring of viciousness, particularly for agriculturists locally.

De Waal likewise watches that after 1985–1986, there was a power vacuum in the area of contention determination as the administration—with different pillagers—had disturbed the conventional social instruments, however Khartoum did not supplant these neighborhood experts. Peace arrangements postponed for absence of political will, specialist and abilities to mediate, even as Khartoum supported outfitting different performing artists in the contention.

Movements then made new pressures toward the south and east. In a progression of productions, de Waal audits the confirmation and afterward has his proof investigated and touches base at the conclusion that legislature is and was the fundamental driver of the contention in Darfur:

- Government activities/inactions, not environmental change, murdered 200,000 to 400,000 individuals and dislodged 2.5 million.
- Social and political conditions, not just or for the most part atmosphere and land conditions, are the offender.
- A key political issue is absence of help with dissemination of innovation and different sorts of advancement and social-welfare help.
- Government's inability to mitigate enduring and starvation amid awful years and government's inability to ensure Darfur's populace or treat its kin impartially are wellsprings of hatred, prompting resistance.
- "Failed migrants" and other uprooted and resource less (for the most part) guys, lessened to wage workers or poor agriculturists, pick banditry or other vicious occupations, which fuel the contention.
- The economy of contention and war energizes more savagery.

In general, awful government is the primary wellspring of brutality and starvation. Despite the fact that dry season set off the 1984–1985 starvation, which then undermined the old request, the consequent causal connections are political, intensified by remote attacks and impact, indicating awful administration, primarily from Chad locale. De Waal, in his 1984 work, had dependably trusted that the choices made by nearby Darfurian family units would by one means or another outcome in flexibility, yet this was not to be the condition. The blend of government disregard, extra battling and the devastation of customary groups and expert structures, were altogether ensnared in the demise.

3. Summary of Findings, Conclusions and Recommendations

This chapter presents a summary of findings, conclusions and recommendations of the study for both further studies and policy directions. The outline for this chapter follows the objectives of the study

3.0 Effect of Climate Change and War on Security and Environment

Climate scenarios analysis conducted as part of the preparation of Sudan's First National Communication in one of the Sudanese Administrative Regions (Greater Kordofan) indicates that the average temperature is expected to rise significantly relative to baseline expectations. By the year 2060, expected temperature ranges from 1.5° C to 3.1° C through August and between 1.1° to 2.1° through January. Outcomes from some models show that average rainfall decrease of about 6mm/month (5%) during the rainy season. Such disparities in temperature and rainfall will impact adversely the most relevant sectors in Sudan, specifically agriculture health as well as water resources.

Agriculture and Forestry Sector

The study findings show that humid agro-climate zones will shift southwards, rendering areas of the north increasingly unsuitable for agriculture. For instance, in Kordofan Region millet production is predicted to decline between 15% and 62%, sorghum ranging between 29% and 71% and gum Arabic between 25% to 30% throughout the period 2030 to 2060. Most affected will be traditional farmers and pastoralists. It is expected that increases in temperature and variability in precipitation combined with growing socioeconomic pressure are likely to intensify the ongoing process of desertification in Kordofan Region and beyond. Under such a scenario, the area of arable land as well as the gum belt would decrease hence food security and local income will drop dramatically.

Agriculture planning

Strategies to develop the agricultural sector have had inadequate success in achieving their objective due to the low priority assigned to agriculture in allocation of resources, absence of political steadiness and a top-down approach to growth which reduced rural producers to policy-receivers. Lately, Sudan has taken a new and strategic direction to support the agricultural sector. The Agricultural Revival Program (ARP) of 2008 is designed to address past weaknesses and coincides with NAPA objectives. All over Sudan, indigenous competition for land and water resources among different groups has increased over the past forty years. The 1970 land registration, in which unregistered land even where used by tribal communities

were formally recognised by the State, has been a compounding causal factor of violent conflict. Attempts at agricultural reform are also complicated by the presence of two systems of land ownership in Sudan, namely: land ownership under statutory law and land ownership under customary law. In addition, recent government policies favour foreign investors and allocate them vast areas of land.

Water Sector

The study findings show that availability is a perennially critical issue in an extremely arid country. There will be a risk of reduced precipitation and or augmented temperature and evaporation that has grave repercussions for the Sudan region. Conferring from these findings, in a matter of years, availability of water may be the most critical issue confronting the Kordofan Region. The water valuation shows soil moisture declining under future climate circumstances. A combination of the consumption of water, population increase, high rates of evaporation as well as high rainfall variation are predicted to lead to a condition of water crisis.

Water planning

So as to fulfil overall objectives of water resources planning and management as well as enhance the development and implementation of effective national water policies and strategies for integrated water resources management (IWRM), Sudan's National Water Policy was developed in 2003. This brings together aspects of water resources management, utilization, and protection in the context of a single policy and covers sectors including agriculture, industry, health, energy and transportation. To increase its effectiveness, the water policy should pay more attention to pricing and fuller participation by stakeholders. Appropriate concepts that could have been better considered and merged include: adoption of an analytical framework, water as an economic good, institutional and regulatory systems, water conserving, poverty alleviation, incentives, participatory approaches, environmental protection as well as capacity building.

Health Sector

The study findings show that societies in Sudan would be exposed to suggestively increased risk of malaria due to climate change. The examination of Kordofan Region in precise suggests the risk of transmission potential could be increased substantially by 2060. If materialised, not

only would the exploited health care system experience dangerous pressures but the disease would exert a heavy toll on local communities in general.

Decision making Process

All the 25 states within Sudan carry out roles and provide armed with legislative powers as specified in the interim-constitution of 2005 which has governed Sudan since the Comprehensive Peace Agreement (CPA) was signed between the government of Sudan and Sudan Peoples' Liberation Movement (SPLM).

On the national level, the federal arms of the Government of National Unity (GONU) exercise power over legislation, planning and implementation on federal lands, natural resources, mineral and subterranean wealth, inter-state waters, epidemics, national electricity projects and disasters.

Government of Southern Sudan (GOSS) has the power in the areas of police, prisons as well as wildlife services, education, planning, welfare and health and coordinate with GONU on concurrent powers.

Government organs of the State exercise power, within borders of the state, over state lands, natural resources, wildlife, non-Nile water, animal wealth, and electric power. States sequentially are divided into localities governed by local assemblies. Members of assembly are directly elected and as such link proletarian governance to the federal government in general. There are synchronised powers where federal (national), regional (GOSS) as well as state organs exercise power over education, health, environment, tourism, industry and meteorology.

3.1 Conclusion

The study represents an attempt to understand the relationship between environmental climatic factors and the conflict dynamics of the Darfur region in Sudan. The double exposures framework is used to structure the analysis, as it recognises the interplay of social, political and economic factors that influence outcomes. It identifies that factors from global climatic change to local political dynamics intensify the competition for scarce water and pasture, the degradation of natural resources and in the worst cases, ferocious war.

Although local communities perceive a trend of deterioration in the climate (frequent and longer droughts, drying up of perennial lakes and the declining capacity of wells), historical accounts show that extreme climatic conditions are not a new phenomenon in the study area.

Pastoralists have long established customary institutions that help them gather resources across space and time in order to endure in their environment conditions.

External impacts, nevertheless, bring in new dynamics that these institutions were not designed to cater. The development and growth of private ranches inhibit one crucial coping strategy of pastoralists movement. On the other hand, ethnic federalism is construed by local ethnic groups as an exclusionary right to land and water and disrupts another coping strategy: reciprocal grazing arrangements. Policy makers ought to take into deliberation the long-term consequences of political actions such as leasing land to investors and delineating of borders. New actors (in this case, private ranchers) wishing to utilise local resources should closely consider their impact on local dynamics and try to minimise the detrimental impact. Attempts should be made to share resources with local communities. Local communities should be involved in the initial stages of new developments in order to develop trust and mutual respect.

The communication between private ranchers and local communities is, nevertheless, little researched in the study locality. In particular, further research on the impact that these new market agents have on the coping strategies of local communities is important for policy makers who want to achieve the two objectives of promoting development and regarding the rights of indigenous populations with respect.

3.2 Recommendations

Climate change is often said to lead to violent conflicts, as per available resources decline and the competition for resources increases comparatively. From this perspective, the report “*Climate to Conflict?*

Lessons from the war regions” attempts to explain the relationship between environmental/climatic factors and the conflict dynamics in Darfur. Through its analysis and conclusion, it has shown that deterioration in the climate and environment alone may not lead to conflict, as local populations have learned to adapt to their environments. This is when it becomes associated with other social, economic and political factors that aggravate scarcity that conflict become more probable.

The following are policy recommendations that come out of the study:

- ***Inspire attempts to preserve and/or restore the environment at the local level***

The part that diminishing resources play in influencing conflict dynamics cannot be taken too lightly. With deteriorating environmental capacity, factors such as population growth enhance

competition for scarce resources and disturb any compromise that may have previously existed between different groups of people. Consequently, policy initiatives that promote environmental preservation and regeneration in the study area are paramount. Some of these endeavours involve water-saving and storing initiatives, rehabilitation of deep wells as well as formal and customary protection of grazing lands. Such activities reduce the pressure on the natural environment to support the population and various economic systems. Sustainable use of the environment is paramount to any political initiative to bring peace.

- Customary institutions and government offices should find ways of cooperating to manage local resources. Improve transparency in how decisions are made.

The study shows that the commitment of central government to respect customary institutions is not followed up at the local level. Formal government structures have undisputed power over natural resources although customary institutions have developed systems that help them manage and share resources. This overlapping of authority over how resources are used locally has set customary institutions and local governmental offices on a collision course. In some scenarios, local governmental offices have overruled decisions made by customary establishments. This undermines the authority of customary institutions and increases the tension between ethnic groups. Efforts should be made to minimise such contradictions. Educating officials of government who take office in remote areas about customary institutions may increase the likelihood of cooperation between formal and customary governance schemes.

- Involve local communities in decisions made in the name of development

When land that has belonged to indigenous populations is handed over to entrepreneurs for investment, this disrupts the coping strategies and livelihoods of people who have depended on it. In the case of Ethiopia, the government hands land it classifies as 'wasteland' over to investors. However, this land plays an important role in local peoples' lives and beliefs. The government should uphold its commitment to respect indigenous populations and their customary systems. In cases where investment is believed to better the position of local people and the economy, the local population should be involved in such decisions. In addition, the local population should be compensated for its estimated loss of income as a result of the new activity.

Investors who wish to acquire land could be required to map out the effects of their projects on the local communities and the areas of cooperation they have identified before they start them.

In cases where their activities would disturb local livelihoods, they should bear the burden of accommodating the local population's needs. They should document that they have discussed any project with leaders of local communities and found a compromise. Such documentation could be reviewed by both the central government bodies and representatives of indigenous people.

- Restrict the proliferation of arms

The proliferation of arms in the study area has contributed to the increase in the damage caused by inter-ethnic conflicts. Local initiatives to curb the spread of arms should be supported. The Nairobi Declaration of 2000 and subsequent protocols represent a step in the right direction. However, setbacks and problems have been observed in these initial attempts. Local societies resist being disarmed, because they fear being left vulnerable while their neighbours still have armaments. There are also instances where the arms acquired through these initiatives have ended up being resold and recirculated among the local populations. To thrive, all disarmament must be overall, unbiased and supervised by an impartial third-party figure.

- Encourage local initiatives to promote peace

In the study area, the local population expressed trust in what are locally called 'peace committees'. These are innovative initiatives started by NGOs working on the ground in collaboration with the local communities and have a good track record of success.

- The committees are composed of community elders from different ethnic groups.

There are peace groups in both Northern Kenya and Southern Ethiopia. Occasionally, they hold meetings across the border in each other's countries. As the elder's command, great respect among their own communities, decisions made in these peace committees reach respective communities quickly. The calm achieved in Northern

Kenya through these peace committees that have worked across ethnic groups and across the border is commendable.

- Employment opportunities for the youth

The young people in the society that take part in cattle raiding and sometimes are seen working independently to acquire access to financial capital. There are examples of youths involved in both highway robbery and cattle raiding to cover their basic needs. Furthermore, youths who have little opportunity to be engaged in income-generating productive activity can easily be

recruited into groups that later develop into rebels. It is therefore crucial that policies that create employment opportunities for the youth should be given priority. One instrument is to link the pastoralist economy with the larger economy so that pastoralist products can be marketed to the general population of inhabitants. Currently, a combination of large and small traders is the link between the general population and pastoralists. Hard work should be put into expanding this link and involve pastoralists in trading activities within the larger economic markets. Such schemes would give an incentive to the youth to find creative ways of providing their local products for the consumption of the general population.

- Raise awareness to reduce cattle raiding

Diverse members of pastoralist communities play their own respective roles in cattle raiding as elaborated in the statement. This activity, however, causes retaliatory action from the communities that have been the victims of cattle raiding. In this development of attacks and retaliations the level of violence in the region heightens. There are NGOs currently working on the ground to raise awareness among pastoralist communities of the harmful effects of cattle raiding. Such efforts should be encouraged.

References

- NIANG I, RUPPEL OC, ABDRABO MA, ESSEL A, LENNARD C, PADGHAM J, URQUHART P. (2014). Africa. In: *Climate change 2014: impacts, adaptation and vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge.
- Intergovernmental Panel on Climate Change. (2014). *Climate Change 2014—Impacts, Adaptation and Vulnerability: Regional Aspects*. Cambridge University Press.
- FRANÇOIS, M., & SUD, I. (2006). Promoting stability and development in fragile and failed states. *Development policy review*, 24(2), 141-160.
- FERGUSON, J. (2015). *The World Will Soon be at War Over Water*. Retrieved from newsweek:<http://europe.newsweek.com/world-will-soon-be-war-over-water-324328?rm=eu>
- GOLDENBERG, S. (2014). *Why global water shortages pose threat of terror and war*. Retrieved from theguardian: <https://www.theguardian.com/environment/2014/feb/09/global-water-shortages-threat-terror-war>
- NASA. (2017). *Climate change: How do we know?* Retrieved from NASA Global Climate Change: <https://climate.nasa.gov/evidence/>
- NOTARAS, M. (2009). *Does Climate Change Cause Conflict?* Retrieved from Our World: <https://ourworld.unu.edu/en/does-climate-change-cause-conflict>
- SANTER, B. (1996). A search for human influences on the thermal structure of the atmosphere. *Nature* vol 382, pp. 39-46.
- HARDY, J. T. (2003). *Climate Change: Causes, Effects, and Solutions*, West Sussex, England, John Wiley and Sons Ltd.
- NIANG, I. & RUPPEL, O. C. (2014). Volume II: Regional Aspects, Africa. In: FIELD, C. B., BARROS, V. R., MACH, K., MASTRANDREA, M. D. & ABDRABO, M. A. K. (eds.) *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Cambridge, United Kingdom.
- REUVENY, R. (2007). Climate Change-Induced Migration and Violent Conflict. *Political Geography*, 26, 656-673.
- TACOLI, C. (2011). Not only climate change: mobility, vulnerability and socio-economic transformations in environmentally fragile areas of Bolivia, Senegal and Tanzania. *Human Settlement Working Paper Series*, 28.
- JOHN, W. (2011). Emerging Socio-Economic and Political Conflicts in Tanzania. *Peace and Conflict Monitor*. San Jose, Costa Rica: University for Peace.
- CRESWELL, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- DENZIN, N. K., & LINCOLN, Y. S. (2011). *The Sage handbook of qualitative research*. Sage.

- HARWELL, M. R. (2011). "Research design: Qualitative, quantitative, and mixed methods" In C. C., & S. R.C., *The Sage handbook for research in education: Pursuing ideas as the keystone of exemplary inquiry* (Second ed., p. 151). Thousand Oaks, CA: Sage.
- MACK, N., WOODSONG, C., MACQUEEN, K. M., GUEST, G., & NAMEY, E. (2005). *Qualitative research methods: a data collectors field guide*.
- STRAUSS, A., & CORBIN, J. (1998). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques* (2nd edition ed.). Thousand Oaks: CA: Sage.
- KOUL, L. (2009). *Methodology Of Educational Research, 4Enew E*. Vikas Publishing House Pvt Ltd.
- STERNBERG, R. J. (1991). Editorial. *Psychological Bulletin*, 109, 3-4.
- BAUMEISTER, R. F., & LEARY, M. R. (1997). Writing narrative literature reviews. *Review of general psychology*, 1(3), 311.
- PRINSTEIN, M. J. (ED.). (2012). *The portable mentor: Expert guide to a successful career in psychology*. Springer Science & Business Media.
- HIGGINS, J. P., & GREEN, S. (2014). *Cochrane Handbook for Systematic Reviews of Interventions Version 5.1. 0* (updated March 2011), The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.
- ALKIRE, S. (2003). *A conceptual framework for human security*. Oxford: Centre for Research on Inequality, Human Security and Ethnicity, University of Oxford.
- BARNETT, J., & ADGER, W. N. (2007). Climate change, human security and violent conflict. *Political geography*, 26(6), 639-655.
- BRAUCH, H. G. (2008). Conceptualising the environmental dimension of human security in the UN. *International Social Science Journal*, 59(s1), 19-48.
- BRAINARD, L., & CHOLLET, D. (Eds.). (2007). *Too poor for peace?: global poverty, conflict, and security in the 21st century*. Brookings Institution Press.
- BRINKLEY, A. (1998). *Liberalism and its Discontents*. Harvard University Press.
- BROWN, O., HAMMILL, A., & MCLEMAN, R. (2007). Climate change as the 'new' security threat: implications for Africa. *International affairs*, 83(6), 1141-1154.
- BUHAUG, H., GLEDITSCH, N. P., & THEISEN, O. M. (2010). Implications of climate change for armed conflict. *Social dimensions of climate change: Equity and vulnerability in a warming world*, 75-102.
- BUSH, G. W. (2009). *The national security strategy of the United States of America*. Wordclay.
- CAMPBELL, K. M., GULLEDGE, J., MCNEILL, J. R., PODESTA, J., OGDEN, P., FUERTH, L., ... &

WEITZ, R. (2007). *The age of consequences: the foreign policy and national security implications of global climate change*. CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES WASHINGTON DC.

CASTLES, S., DE HAAS, H., & MILLER, M. J. (2013). *The age of migration: International population movements in the modern world*. Palgrave Macmillan.

CHANGE, I. P. O. C. (2007). Climate change 2007: The physical science basis. *Agenda*, 6(07), 333.

DAVIES, L. (2003). *Education and conflict: Complexity and chaos*. Routledge.

DALLE, G. (2013). 7. Climate change and transboundary issues in East Africa. *Climate Change Vulnerability and Risk Assessment of Agriculture and Food Security in Ethiopia*, 122.

DAVIES, A., & QUINLIVAN, G. (2006). A panel data analysis of the impact of trade on human development. *The Journal of Socio-Economics*, 35(5), 868-876.

DIEHL, P. F., & GLEDITSCH, N. P. (Eds.). (1998). Special Issue, Environmental Conflict. *Journal of Peace Research*, 35(3).

DIEHL, P. F., & GLEDITSCH, N. P. (2001). Controversies and questions. In P. F. Diehl, & N. P. Gleditsch (Eds.), *Environmental conflict* (pp. 1e12). Boulder, CO: Westview.

DURHAM, W. (1979). *Scarcity and survival in Central America: The ecological origins of the Soccer War*. Stanford: Stanford University Press.

FIELDING, A. J. (2011). The impacts of environmental change on UK internal migration. *Global Environmental Change*, 21, S121-S130.

FLANNIGAN, M. D., KRAWCHUK, M. A., DE GROOT, W. J., WOTTON, B. M., & GOWMAN, L. M. (2009). Implications of changing climate for global wildland fire. *International journal of wildland fire*, 18(5), 483-507.

GENCER, E. A. (2013). *The Interplay between Urban Development, Vulnerability, and Risk Management: A Case Study of the Istanbul Metropolitan Area* (Vol. 7). Springer Science & Business Media.

GLEDITSCH, N. P., NORDA°S, R., & SALEHYAN, I. (2007). *Climate change, migration and conflict*. New York: International Peace Academy.

GOPIN, M. (2009). *To make the earth whole: The art of citizen diplomacy in an age of religious militancy*. Rowman & Littlefield Publishers.

GREGORY, J. N. (1989). *American exodus: The Dust Bowl migration and Okie culture in California*. New York: Oxford University Press.

GROVER, V. I. (Ed.). (2008). *Water: A source of conflict or cooperation?*. Science Publishers.

- HAN, E., O'MAHONEY, J., & PAIK, C. (2014). Conflict Management and *Conflict Management and Peace Science*, 31(1), 49-69.
- HOMER-DIXON, T. F. (1999). Environment, scarcity, and violence. Princeton: Princeton University Press.
- HOMER-DIXON, T. F., & PERCIVAL, V. (1996). Environmental scarcity and conflict: Briefing book. Toronto: AAAS.
- HSIANG, S. M., BURKE, M., & MIGUEL, E. (2013). Quantifying the influence of climate on human conflict. *Science*, 341(6151), 1235367.
- ISSAR, A. S. (2012). *Water shall flow from the rock: hydrogeology and climate in the lands of the Bible*. Springer Science & Business Media.
- JÓNSSON, G. (2010). The environmental factor in migration dynamics: a review of African case studies.
- KAHL, C. H. (2006). States, scarcity, and civil strife in the developing world. Princeton University Press.
- KHAN, S., & NAJAM, A. (2009). The Future of Globalization and Its Humanitarian Impacts. *Humanitarian Horizons Project, FIC: <https://wikis.uit.tufts.edu/confluence/display/FIC/The+Future+of+Globalization+and+its+Humanitarian+Impacts>*.
- LAPPE, F. M., COLLINS, J., & FOWLER, C. (1977). *Food first. Beyond the myth of scarcity*. Houghton Mifflin Co..
- LEE, S. W. (2001). Environmental matters: Conflict refugees and international relations. Tokyo: World Human Development Institute Press.
- MCLAUGHLIN MITCHELL, S. (Ed.). (2006). Special Issue, Conflict and Cooperation over International Rivers. *Political Geography*, 25(4).
- MENZEL, D. C. (2012). *Ethics management for public administrators: Leading and building organizations of integrity*. ME Sharpe.
- MESSER, E. (2010). Climate Change and Violent Conflict. *Oxfam American*, 1.
- MITCHELL, C. (2014). *The nature of intractable conflict: Resolution in the twenty-first century*. Springer.
- ONYANGO, D. O. (2013). *Climate change and conflict: A case study of Darfur conflict* (Doctoral dissertation, University of Nairobi).
- PARHAM, P. E., WALDOCK, J., CHRISTOPHIDES, G. K., HEMMING, D., AGUSTO, F., EVANS, K. J., ... & LENHART, S. (2015). Climate, environmental and socio-economic change: weighing up the balance in vector-borne disease transmission. *Phil. Trans. R. Soc. B*, 370(1665), 20130551.

RALEIGH, C., & URDAL, H. (2007). Climate change, environmental degradation and armed conflict. *Political geography*, 26(6), 674-694.

REUVENY, R. (2007). Climate change-induced migration and violent conflict. *Political geography*, 26(6), 656-673.

REUVENY, R. (2008). Ecomigration and violent conflict: Case studies and public policy implications. *Human Ecology*, 36(1), 1-13.

SCHEFFRAN, J. (2008). Climate change and security. *Bulletin of the atomic scientists*, 64(2), 19-25.

SCHEFFRAN, J., BRZOSKA, M., KOMINEK, J., LINK, P., & SCHILLING, J. (2012). Climate change and violent conflict. *Science(Washington)*, 336(6083), 869-871.

SHELLEY, M. R. (1992). The Chittagong Hill Tracts of Darfur-Sudan: The untold story. Dhaka, Darfur-Sudan: Center for Development Research.

SIMMONS, A. (2010). *Immigration and Canada: Global and transnational perspectives*. Canadian Scholars' Press.

STRONG, A. C. (2015). Nuestro Mundo A Martiano Exploration of the Existential Impact of Climate Change.

UNDP, "Human Development Report 1994: New Dimensions of Human Security" (1994).

VITALIS PEMUNTA, N., & BRICE ARISTIDE, A. (2013). Socio-spatial occupation, conflict and humanitarian assistance for Bororo cross-border migrants in east Cameroon. *International Journal of Development Issues*, 12(3), 271-288.

WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (WCED), "Our Common Future" (1987): www.un-documents.net/wced-ocf.htm.

WEILL, P., & VITALE, M. (2013). *Place to space: Migrating to eBusiness Models*. Harvard Business Press.

WCED, U. (1987). Our common future. *World Commission on Environment and Development Oxford University Press*.

WORSTER, D. (1979). *Dust Bowl: The Southern Plains in the 1930s*. New York: Oxford University Press.

YASSINE-HAMDAN, N., & PEARSON, F. S. (2014). *Arab Approaches to Conflict Resolution: Mediation, negotiation and settlement of political disputes*. Routledge.

ZHAI, P. M., & PAN, X. H. (2003). Change in extreme temperature and precipitation over northern China during the second half of the 20th century. *Acta Geographica Sinica*, 58(S1), 1-10.

RENNER, M. (2007). Desertification as a Source of Conflict in Darfur. Worldwatch Institute (June 23): www.worldwatch.org/node/5173.

REUVENY, R. (2007). Climate Change-Induced Migration and Violent Conflict. *Political Geography* 26, 6: 656–693.

SANFORD, V., & A. ANGEL-AJANI. (2006). *Engaged Observer: Anthropology, Advocacy, and Activism*. New Brunswick: Rutgers University Press.

SCHEFFRAN, J. (2009). Climate Change, Social Stress, and Violent Conflict. State of the Art and Research Needs: www.klimacampus.de/fileadmin/campusintern/dokumente/Veranstaltungen/Conference_Climate_Conflict_Call_for_Papers.pdf.

SCHUEMER-CROSS, T. & TAYLOR, B. H. (2009). *The Right to Survive*. Oxford: Oxfam International.

BOKO, M., NIANG, I., NYONG, A., VOGEL, C., GITHEKO, A., MEDANY, M., OSMAN-ELASHA, B., TABO, R. AND YANDA, P. (2007). *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate*.

BROOKS, N. (2006). *Climate Change, drought and pastoralism in the Sahel*, Discussion note for the World Initiative on Sustainable Pastoralism, November 2006.

HOLMES, J. (2008). 'The need for collaboration' in *Forced Migration Review: climate change and displacement*, Issue 31, October 2008, Oxford Refugee Studies Centre.

GARCIA, D. (2008). 'The climate security divide: Bridging human and national security in Africa', *The African Security Review*, 17.3, Institute for Security Studies: 2–17.

AFRICAN UNION (2007). *Decision on Climate Change and Development in Africa*, 29–30 January 2007, Doc. Assembly/AU/12 (VIII).

EU (2003). *A Secure Europe in a better world – The European Security Strategy*, Brussels.

WBGU. (2007). *Climate change as a security risk*, German Advisor Council on Global Change (WBGU), Earthscan, London.