# Climate Change and Land Use Conflicts in Northern Africa

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## Introduction

Northern Africa is heavily affected by climate change (1). Rising temperatures and changes in rainfall patterns are likely to increase the risk of floods and droughts (Figure 1) and thereby to aggravate anthropogenic land and water degradation. This in turn threatens the agricultural sector which is highly important for the region's economic growth and food security. On a local scale, climate change puts traditional resource sharing mechanisms under pressure. Against this background, the following research questions can be posed:

## Research Questions

- What role does climate change play in land use conflicts?
- Can climate change cause violence?
- How does climate change interact with existing societal problems?

To answer these questions, it is essential to first identify conflict vulnerable regions.

## Conflict Vulnerability

How likely a country is damaged or disrupted by the impact of violent conflict depends on several factors including strong population growth, unequal access to resources, high level of poverty and strong conflict history. According to these factors, the southern states of the considered region, namely Niger, Chad and Mali have a relatively high conflict vulnerability (Table 1).

## Farmer-Herder Conflicts in Mali

Songhai farmers plant rice in the shallow waters of the Niger river. At the same time, Tuareg herders feed their livestock with burgu, a plant which grows in deeper water of the river. Since 1950 the maximum flood levels of the Niger river have decreased overall and especially during the droughts of the 1970s and 1980s. This has led the Songhai to move their rice fields continuously into the burgu growing areas. Consequently, a land use conflict has evolved which occasionally leads to violence between the two groups (3).

## Model Framework

To improve the understanding of the complex causal relationships within and between the human and the climate system, it is important to describe them schematically and actor-centered. Figure 3 shows how climate change affects the water and land availability and therefore the farmers' and herders' wellbeing. Conflict as well as cooperation are only two possible outcomes out of a variety of adaptation strategies

## Conclusion

Climate change does not directly cause violent conflicts. However, climate change has the potential to increase resource scarcity and thereby act as a threat multiplier when it interacts with existing societal problems. The extent to which climate change is relevant for conflicts is currently discussed controversially and not yet fully understood. To contribute to the understanding of the linkages between climate change and land use conflicts, it is promising to combine model framework approaches with qualitative case-studies.

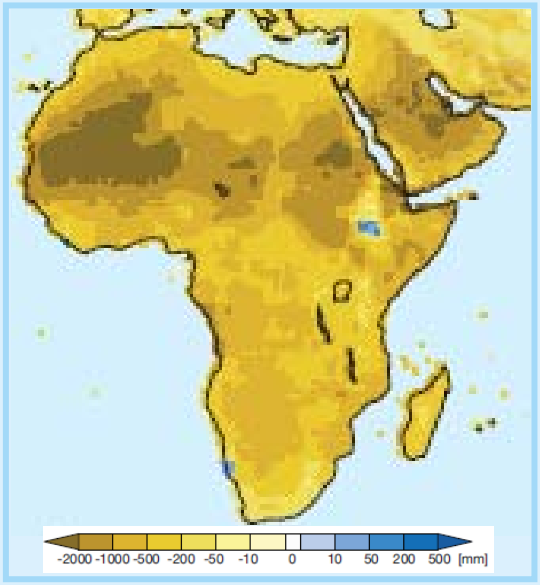


Figure 1: Drought risk in Africa. The figure shows the absolute changes in the climatic water balance simulated for the period 2041 to 2070 compared to simulated data for the period 1961–1990 (2)

| State | Population (in millions) | | | Gini index[1] | GDP[2] per capita (PPP US$) | HD[3] in 2007 | Number of conflicts 1989-2008 |
|---|---|---|---|---|---|---|---|
| | 2009 | 2025 | 2050 | | | | |
| Sudan | 42.3 | 56.7 | 75.9 | N/A | 2086 | medium | 20 |
| Algeria | 35.4 | 43.7 | 50.5 | 35.3 | 7740 | medium | 18 |
| Chad | 10.3 | 13.9 | 20.5 | 39.8 | 1477 | Low | 16 |
| Niger | 15.3 | 27.4 | 58.2 | 43.9 | 627 | Low | 8 |
| Egypt | 78.6 | 99.1 | 122.3 | 32.1 | 5329 | medium | 6 |
| Mali | 13.0 | 18.6 | 28.3 | 39.0 | 1083 | Low | 4 |
| Morocco | 31.5 | 36.6 | 42.4 | 40.9 | 4108 | medium | 1 |
| Western Sahara | 0.5 | 0.8 | 0.9 | N/A | N/A | N/A | 1 |
| Libya | 6.3 | 8.1 | 9.8 | N/A | 14364 | High | 0 |
| Mauritania | 3.3 | 4.6 | 6.9 | 39.0 | 1927 | medium | 0 |
| Tunisia | 10.4 | 12.2 | 13.9 | 40.8 | 7520 | medium | 0 |
| Total | 246.9 | 321.7 | 429.6 | | | | 74 |

[1] average 1991–2007, the Gini index lies between 0 and 100. A value of 0 represents absolute equality and 100 absolute inequality;
[2] in 2007; [3] Human Development
Table 1: Population, economy, human development and conflicts in Northern Africa (3)

Figure 2: Possible link between climate change and conflict

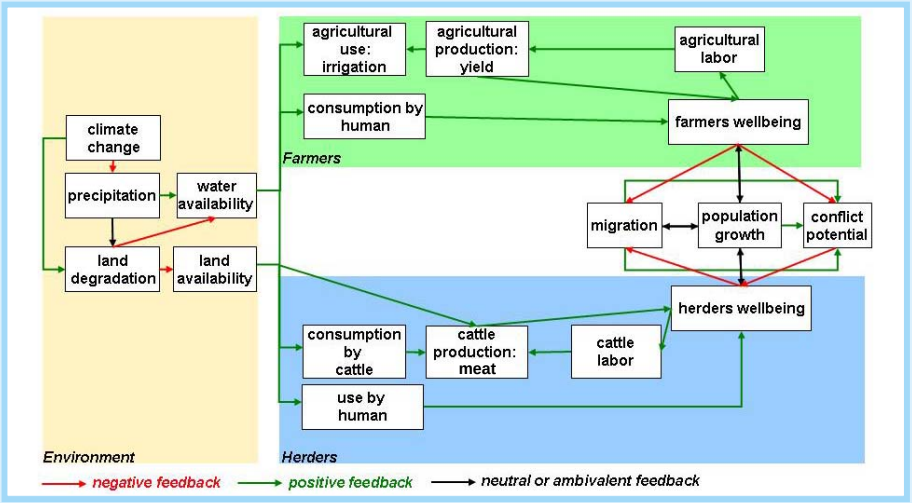


Figure 3: Model framework for analyzing water and land use conflicts in Northern Africa (3)

Major References

(1) IPCC, *Climate Change 2007. Climate Change Impacts, Adaptation and Vulnerability, Working Group II, Summary for Policymakers*. (Intergovernmental Panel on Climate Change, Geneva, 2007).

(2) WBGU, World in Transition - Climate Change as a Security Risk. (Earthscan, London, 2009).

(3) J. Schilling, J. Scheffran, P. M. Link, "Climate Change and Land Use Conflicts in Northern Africa" in Continents under Climate Change, W. Endlicher, F.-W. Gerstengarbe, Eds. (Nova Acta Leopoldina, Halle, 2010), vol. 112, pp. 173 –182

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