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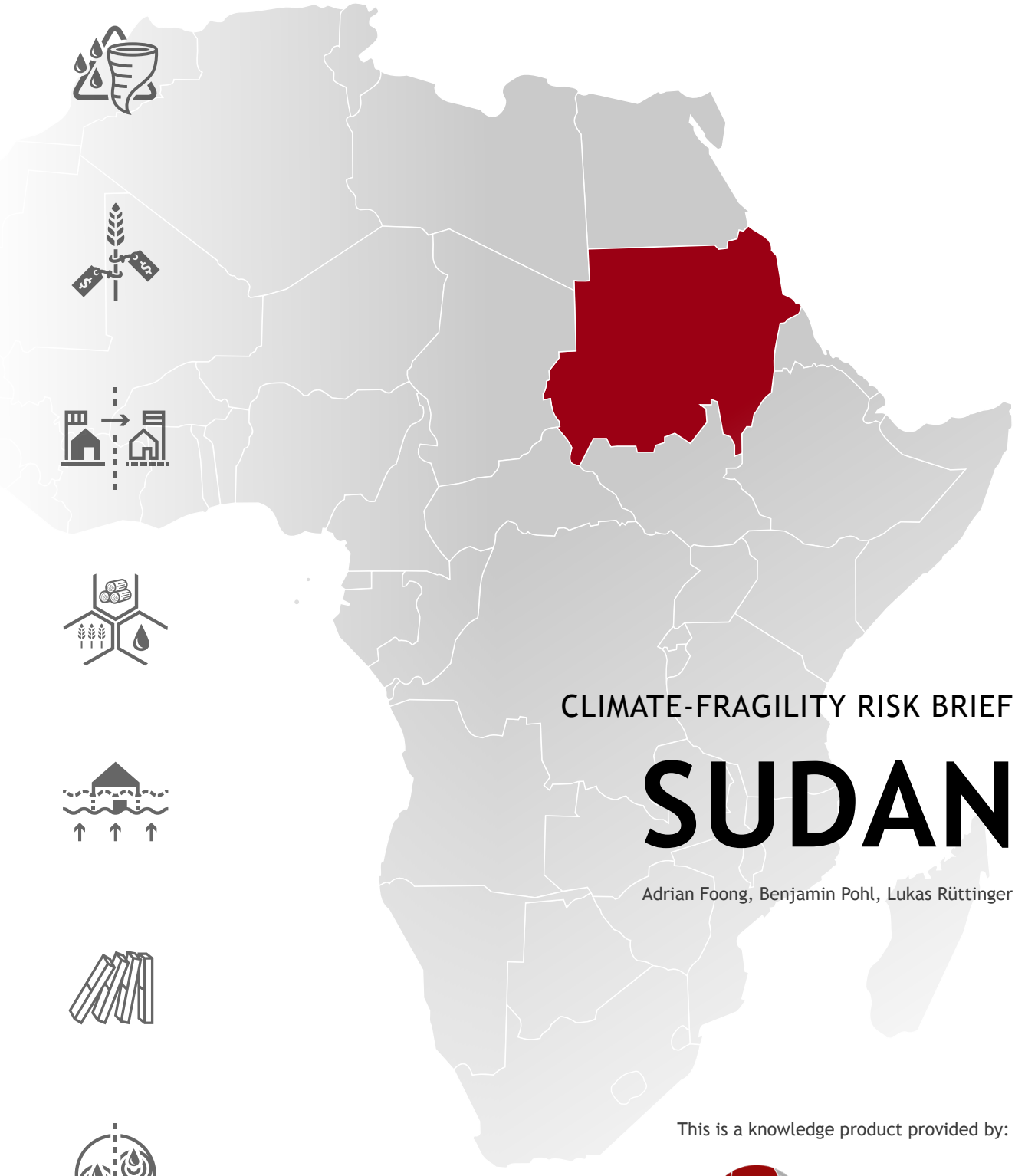

CLIMATE-FRAGILITY RISK BRIEF

SUDAN

Adrian Foong, Benjamin Pohl, Lukas Rüttinger

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CLIMATE SECURITY EXPERT NETWORK

Climate-Fragility Risk Brief: Sudan

AUTHORED BY

Adrian Foong is an Analyst at adelphi in the field of climate diplomacy, focusing on climate, development and foreign policies and how these can be developed to address climate-related security and fragility risks.

Benjamin Pohl heads the Climate Diplomacy and Security programme at adelphi, where he works on the interface of environmental change, foreign policy, peacebuilding and global sustainable development.

Lukas Rüttinger is a Senior Advisor at adelphi, working at the intersection of environment, development, foreign and security policy. Published widely on these topics, he is the lead author of the 2015 report "A New Climate for Peace".

EXPERT REVIEW BY

Mey Eltayeb Ahmed (Climate Change, Peacebuilding, and Social Protection Advisor)

PROVIDED BY

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It does so by synthesising scientific knowledge and expertise, by advising on entry points for building resilience to climate-security risks, and by helping to strengthen a shared understanding of the challenges and opportunities of addressing climate-related security risks. www.climate-security-expert-network.org

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Contact: secretariat@climate-security-expert-network.org

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SUMMARY

Most Sudanese depend on agriculture for their livelihoods and are hence directly impacted by climate change. Indeed, Sudan has experienced rising temperatures and worsening droughts and floods in the past, and this trend is likely to continue in the future, putting the country's agricultural communities and overall food and water security at risk.

At the same time, Sudan's political and security situations are precarious: for most of its time since independence, the country has experienced conflict and violence. While the term 'climate war' has been used to draw a direct causal link between climate change and conflict, most notably in Darfur, these conflicts are in reality far more complex.

Instead, many of Sudan's conflicts can be traced back to a history of regional marginalisation, ethno-occupational tensions, and failures in governance. Despite a change in government in 2019 and recent signs of improvements in security and stability, the situation in Sudan remains fragile.

This climate-fragility risk brief outlines three ways in which climate change interacts with and contributes to conflict and fragility in Sudan:

1. Conflict can result directly from **increased competition over the distribution, use of and access to natural resources**, due to a combination of climate impacts, environmental degradation and a growing population.
2. **Displacement and loss of livelihoods resulting from climate change and conflict can lead to maladaptation, more tensions and conflict**, further undermining the resilience of local communities.
3. Inadequate responses to environmental degradation, climate change and multi-dimensional conflict can **undermine the government's legitimacy and capacity**, subsequently feeding into opposition.

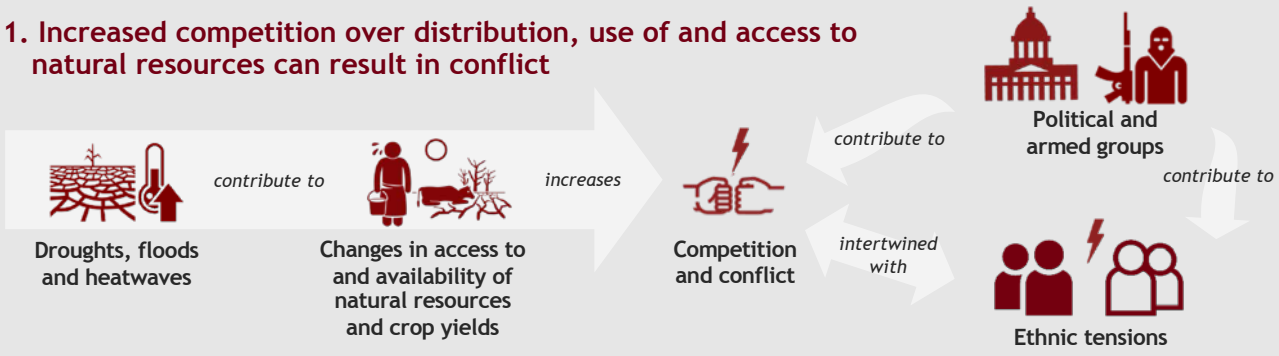
Furthermore, this paper outlines two broad but interlinked levels of entry points for addressing climate-fragility risks in Sudan:

1. The first level is to improve capacities to cope and adapt to climate and environmental change, particularly with regard to **water** and **land management**, and in providing **agricultural support**.
2. The second level is to improve the management of the knock-on effects of climate and environmental change through: (1) **community stabilisation and peacebuilding** to prevent changes in resource access and availability from feeding into conflict; (2) **livelihood support**, which includes strategies to diversify livelihoods to increase resilience; and (3) actions to address **governance challenges** in order to safeguard local progress towards improved natural resource management and extend good practices across the country.

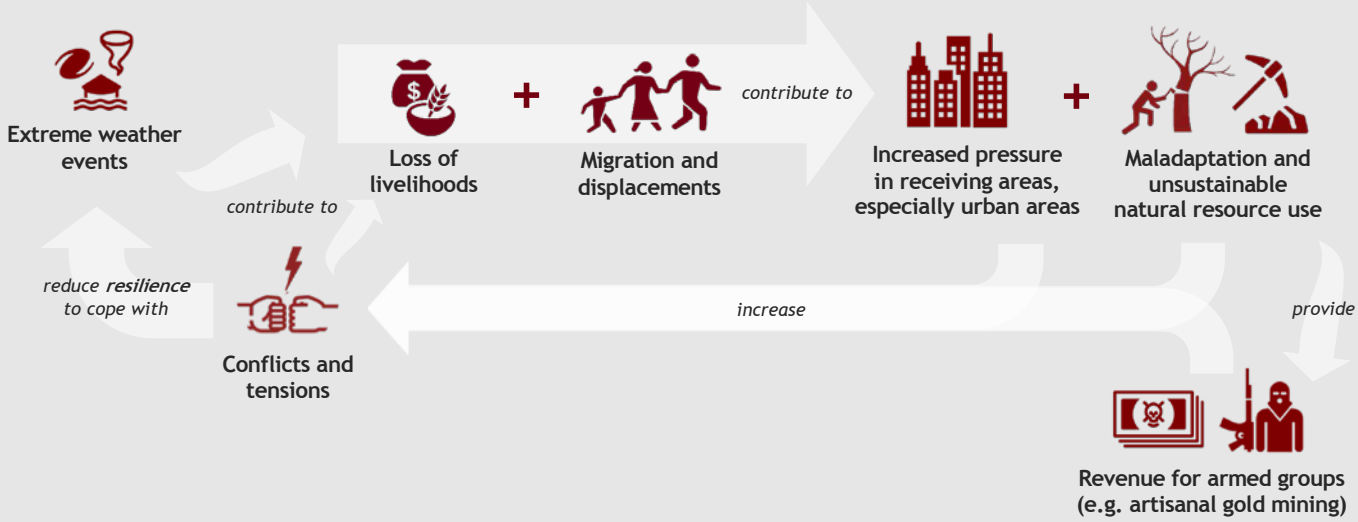
In short, efforts in building livelihood resilience in Sudan need to be buttressed by broader governance improvements. Moreover, all interventions should be deliberately leveraged to bring communities together, and they need to ensure that the most vulnerable and marginalised groups, for example women and youth, are empowered.

Climate fragility risks in Sudan

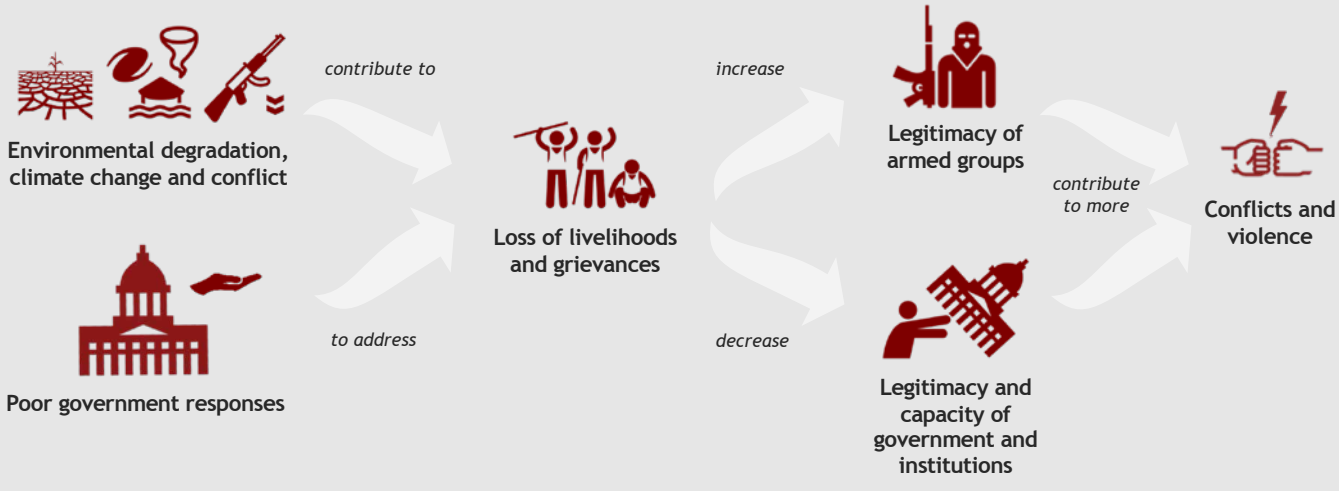
1. Increased competition over distribution, use of and access to natural resources can result in conflict

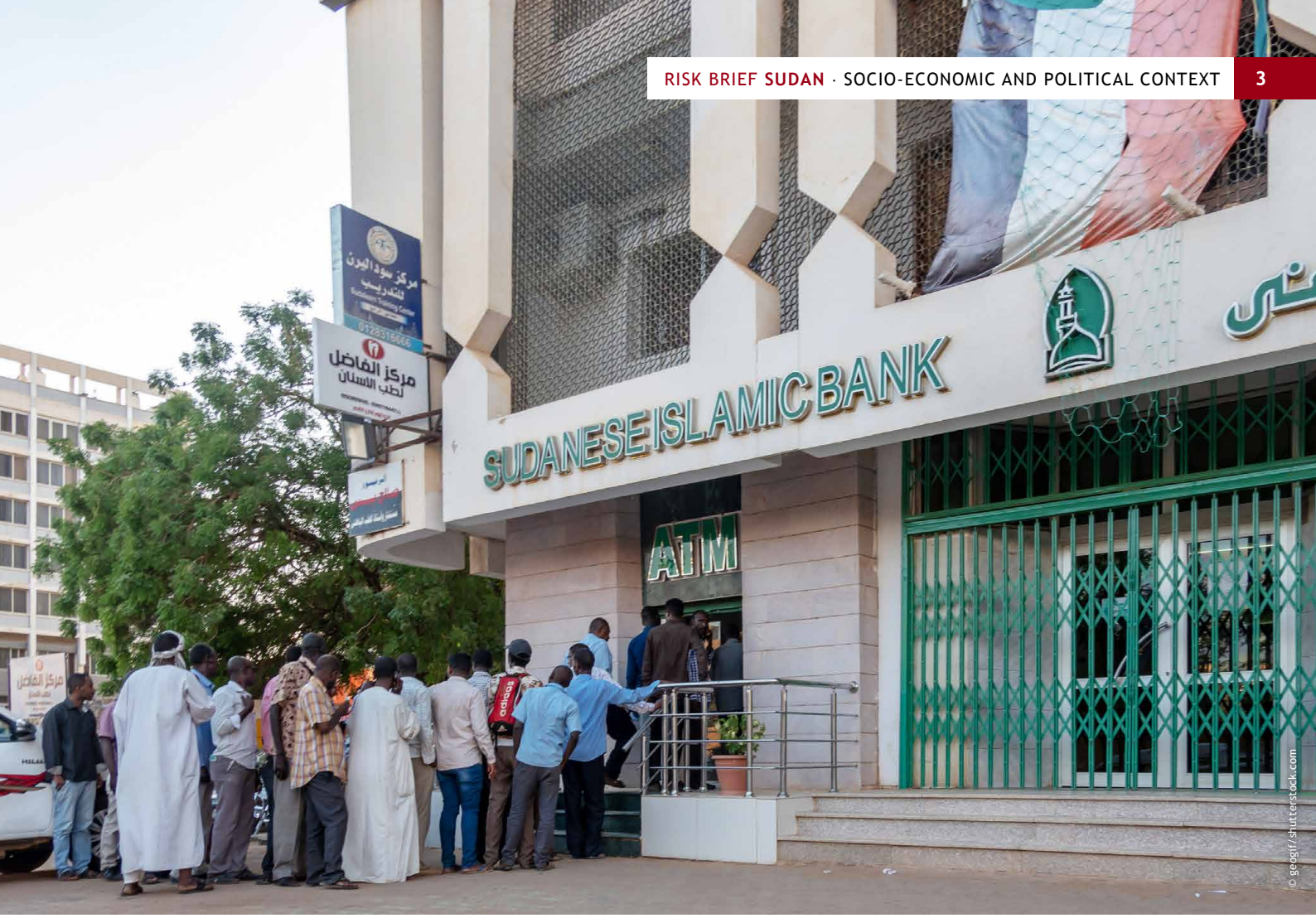


2. Displacement and loss of livelihoods due to climate change and conflict can contribute to maladaptation and more tensions and conflict



3. Inadequate responses to environmental degradation, climate change and conflict can undermine government legitimacy and capacity





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SOCIO-ECONOMIC AND POLITICAL CONTEXT

Social and economic context

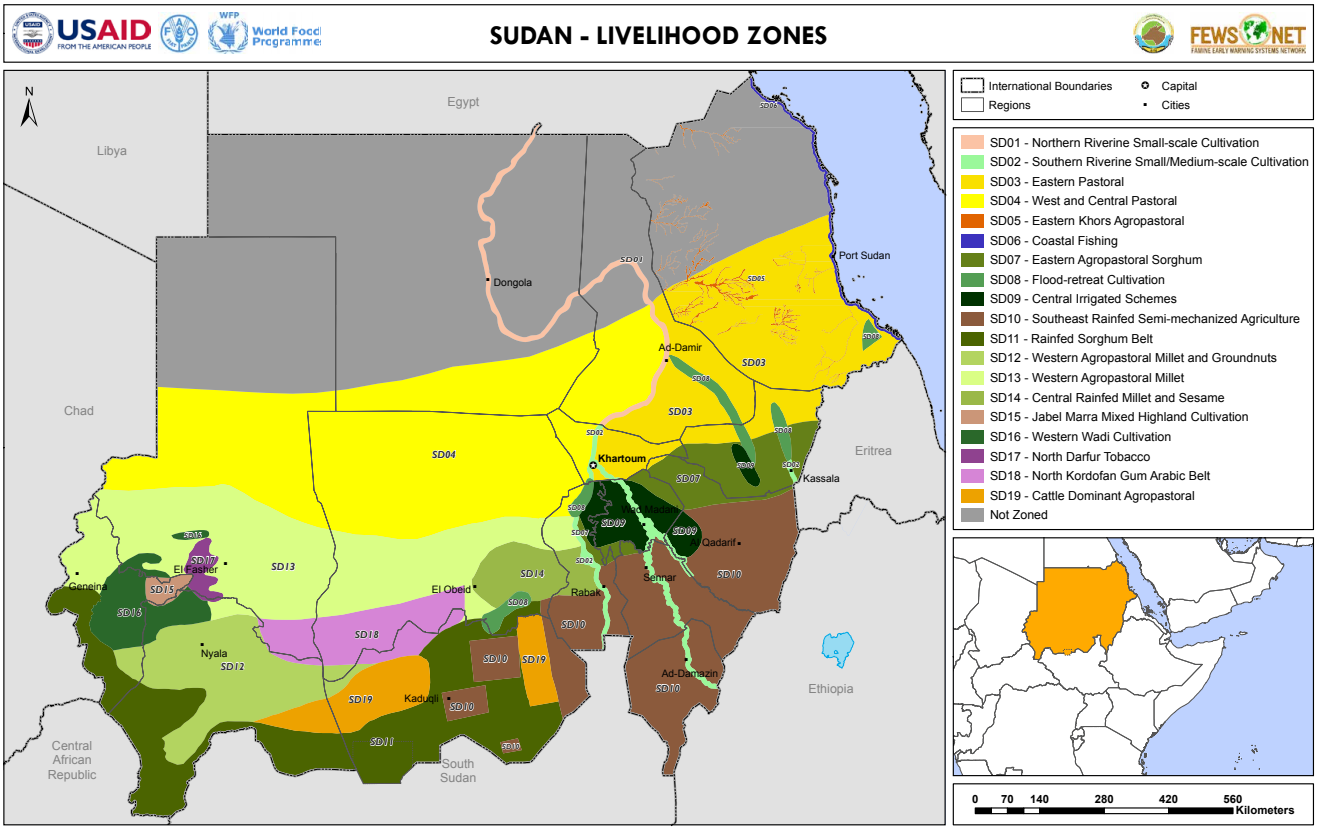
As of 2020, Sudan's population numbered more than 43 million (UN, 2019b), much of which is concentrated around the capital city of Khartoum and in the south, while the north is sparsely populated except for areas around the banks of the Nile (CBS, 2018). About a third of the population lives in urban areas, and this number is expected to rise, as is total population size (UN, n.d.).

Sudan's GDP stood at US$ 18.9 billion in 2019 (World Bank, 2020). Much of Sudan's economic growth in the first decade of the 21st century was fuelled by an oil boom, with oil contributing around 8% of GDP and more than 50% of fiscal revenues during that period (AfDB, 2018). However, the secession of South Sudan in 2011 led to the loss of three-quarters of Sudan's oil revenues (AfDB, 2018), although oil still accounted for about a quarter of Sudan's export value in 2018 (Chatham House, 2018).

Agriculture is crucial to Sudan's economy. The sector contributes around 30% of GDP and accounts for 43% of the labour force (FAO, 2020). Yet productivity is relatively low as more than 90% of cultivated land is dominated by rain-fed systems, both mechanised and traditional (Siddig et al., 2018; see also Figure 1). The high dependence of farmers and pastoralists on rainfall patterns, combined with the economy's heavy reliance on agriculture, contributes to Sudan's comparatively high vulnerability to climate change and variability.

Although Sudan has often been mooted as a potential 'bread basket' in Africa because of its fertile lands and livestock, there has been only limited systematic investment into the

Figure 1: Livelihood zones in Sudan.[1]



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agricultural sector, with observers pointing to the government's 'rentier economy' mindset. Moreover, Sudan has huge external debts, most of them in arrears. These, together with economic sanctions imposed by the international community, have limited the influx of both private and public international funding.

This situation could change with recent developments in Sudan's foreign relations. The lifting of U.S. sanctions in October 2017, followed by Sudan's full removal from the U.S. terrorism blacklist in October 2020, opened up the potential for Sudan to reintegrate itself into the global economy and to receive much-needed debt relief and foreign investment. However, challenges remain as Sudan's high external debt stock continues to constrain the country's recovery prospects (AfDB, 2018; Burke and Holmes, 2020).

Sudan also ranks poorly in terms of human development. In the 2019 Human Development Report, Sudan ranked 168 out of 189 countries, and almost half of the population lives below the national poverty line (UNDP, 2019). This varies by state and across the urban-rural divide, with poverty rates in rural areas being higher than those in cities (AfDB, 2018). Against the background of Sudan's ethnic diversity, such differences have contributed to perceptions of unfairness in many peripheral areas. These perceptions are both a consequence and a cause of broader governance challenges.

Sudan's economic situation, together with the conflicts that persist in various parts of the country, has meant that many Sudanese rely on international humanitarian aid. The UN Office for the Coordination of Humanitarian Affairs (UN OCHA) estimates that some 9.3 million people – 23% of the population – are in need of humanitarian assistance in 2020 (UN OCHA, 2020b).

1 For more information on each zone, including the respective agricultural production cycles, food access and income sources, see the full assessment report by FEWS NET (2015). Map source: FEWS NET (2011): https://fews.net/east-africa/sudan/livelihood-zone-map/august-2011.

Political context

For most of the time since its independence from Anglo-Egyptian rule in 1956, Sudan has experienced internal conflict, as have many adjacent countries. Many conflicts are linked to cleavages and strong tensions between Sudan's political centre in Khartoum and its peripheries, which perceive Khartoum's governance as exploitative. Population groups in peripheral regions have frequently expressed grievances over the country's unequal development and governance structures. At the same time, many conflicts have local roots, especially in tensions over natural resources and the power, livelihoods and identity they confer (Bromwich, 2018).

Many of these issues can be traced back to the thirty-year regime of Omar al-Bashir. Coming into power in 1989 through an Islamist-backed coup, al-Bashir's policy of 'Islamic fundamentalism' deepened inter-communal frictions, perceptions of alienation as well as separatist sentiments in peripheral regions, particularly in the south (Medani, 2011). To keep himself in power, al-Bashir also developed a 'personalist' regime that weakened civil society and created a network of patronage, particularly in the security sector (Hassan and Kodouda, 2019). Ironically, this concentration of Sudan's resources in the security sector aggravated the country's overall security challenges, as the lack of social spending in the peripheral regions further added to popular grievances against the regime (Hassan and Kodouda, 2019).

These regional tensions consequently led to a series of peace talks and the 2011 referendum, in which the people of the southern regions voted for secession from Sudan, resulting in the split of South Sudan later that year. This fed into al-Bashir's loss of support and ultimate downfall: because South Sudan held about three-quarters of Sudan's oil reserves, the split drastically reduced Sudan's major source of income, which was key to sustaining al-Bashir's patronage politics (Hassan and Kodouda, 2019). With Sudan's economy increasingly in crisis, anti-government protests erupted across the country in December 2018, which culminated in al-Bashir's removal from power by a military coup d'état in April 2019 (Hassan and Kodouda, 2019).

Even after the ousting of al-Bashir, Sudan's political situation remains fragile, threatened by continuing political instability and military interference in civilian matters (Abbas, 2020). The Transitional Military Council (TMC), formed after al-Bashir's removal, was involved in several incidences of violence but has since given way to a civilian government under the leadership of agricultural economist Abdalla Hamdok, who was sworn in as Prime Minister in August 2019 (Abbas, 2020).

While Hamdok's new government has vowed to steer the country out of the corrupt networks established by al-Bashir's regime, challenges remain (Abbas, 2020). Observers argue that the new government needs to address issues related to economic hardship, competition over land and water resources, rapid urbanisation as well as the marginalisation of regions and societal groups if Sudan's political, economic and security prospects are to improve (Hassan and Kodouda, 2019; UNEP and HCENR, 2020).

Peace and security context

The conflict landscape in Sudan is complex and has different dimensions: clashes between and within various non-state armed groups, challenges against the government, and the government's attempts to control these conflicts.[2] Many of these conflicts arise from group loyalties and identities that are based on ethnic, tribal or occupational lines, all of which are often interlinked as groups splinter and realign. In addition, these conflicts have long been interwoven with tensions over access to natural resources such as water and land rights (Bromwich, 2018).

Figure 2: Location of armed conflicts and events in Sudan, and the associated number of fatalities, during the period 2009 – 2019.[3]

Underlying many of these conflicts, however, are the struggles over marginalisation and the distribution of power between the central government in Khartoum and peripheral communities, particularly those in the West, South and East of Sudan (see Figure 2 for an illustration of where these conflicts have occurred in the past decade). The al-Bashir regime's response to resistance often involved military counter-insurgency, such as the government's military interventions during the South Kordofan conflicts in 2011 (Gramizzi and Tubiana, 2013). In order to consolidate power as part of his 'personalist' regime, al-Bashir performed a delicate balancing act, supporting various militias in parallel to keep the overall security apparatus fragmented (Berridge, 2019; Hassan and Kodouda, 2019). This has resulted in, for example, the government's support for the Janjaweed militia and its ethnically motivated attacks in Darfur. When the Janjaweed grew too powerful in strength and autonomy, al-Bashir responded by turning a faction of the group into an official paramilitary force called the Rapid Support Forces (RSF) to restore balance (Hassan and Kodouda, 2019). These strategies frequently

2 See for example the ECC Factbook cases on Sudan, such as the civil war in Darfur: https://adelph.it/darfurwar.

3 Map was generated on 14.08.2020 using MapX with own elaboration. Data source: ACLED (2019).

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leveraged intercommunal divides and realignments, triggering and deepening intercommunal tensions and conflicts, while at the same time causing state bureaucracies and services to run inefficiently (Hassan and Kodouda, 2019).

Despite repeated negotiations and several peace agreements, fighting is still ongoing in different regions of Sudan. For example, the Comprehensive Peace Agreement (CPA) was signed between the Government of Sudan and the Sudan People's Liberation Movement (SPLM) in 2005 to end decades of civil war in Sudan's southern states, which ultimately led to South Sudan's independence in 2011 (Medani, 2011). Since then, however, tensions and conflicts have persisted in the bordering states of South Kordofan and Blue Nile between the government and factions of the SPLM that remained in Sudan after secession, now known as the Sudan People's Liberation Movement-North or SPLM-N (Gramizzi and Tubiana, 2013).

Similarly, in Darfur, violent conflicts have continued to fester in spite of the signing of two notable peace agreements: the 2006 Darfur Peace Agreement and the 2011 Doha Document for Peace in Darfur (DDPD). Both agreements attempted to address, among other things, power-sharing, wealth-sharing, and ceasefire arrangements between the central government and regional groups, although the DDPD has yet to include all movements and parties involved (Grunfeld and Adam, 2019). More recently, peace talks between the Transitional Government of Sudan and the Darfur armed movements have been taking place since late 2019 in Juba, South Sudan (UN, 2019a). However, observers have pointed out that these talks, like previous ones, remain ineffective as violence continues and parties disagree on several key issues such as power-sharing arrangements (Sudan Tribune, 2020; Yousif, 2020).

Peacekeeping and humanitarian efforts from the international community remain instrumental in stabilising the situation in the various conflicting regions of Sudan, although results have been mixed. Since 2008, the African Union - UN Hybrid Operation in Darfur (UNAMID) has been operating in Darfur under the UN Security Council mandate of supporting mediation between conflicting parties, based on the DDPD (UNAMID, 2020). In light of recent improvements in Darfur's political and security situation, there have been plans for UNAMID to wind down operations by October 2020, although intercommunal clashes, including conflicts between farmers and pastoralists, have persisted even as of early 2020 (UNSC, 2020). Furthermore, observers have pointed out that the International Criminal Court (ICC) indictment of al-Bashir may further complicate and undermine UNAMID's peacekeeping efforts, due to the Sudanese government's growing perception that the international community is taking a confrontational approach towards national matters (Duursma and Müller, 2019).

Another volatile region is the Abyei area in southern Sudan, where the UN Interim Security Force for Abyei (UNISFA) has been deployed since 2011 to maintain security and quell violence in the disputed oil-rich area (UNISFA, 2019). While progress in stabilisation has been made, violations by the security forces of both Sudan and South Sudan have been reported, requiring UNISFA's continued mandate over the area (UNSC, 2019).

Sudan's many conflicts, together with the impacts of drought, have resulted in massive displacements since the 1970s and 80s. As of 2019, there were more than 1.8 million internally displaced persons (IDPs), with a peak of around 3.2 million in 2015 (UNHCR, 2020). Most IDPs were recorded in Darfur, South Kordofan and Blue Nile, with women and children disproportionately making up the larger share of IDP numbers (UN OCHA, 2020b). While the number of displaced persons in Sudan has declined in the past five years, persistent conflicts and unresolved grievances may trigger further displacement (UN OCHA, 2020b). Additionally, Sudan hosts an estimated 1.1 million refugees, including the largest number of refugees displaced as a result of conflict in South Sudan, due to Sudan being both a destination country and a transit country along the eastern Africa migratory route into North Africa and Europe (UN OCHA, 2020b).

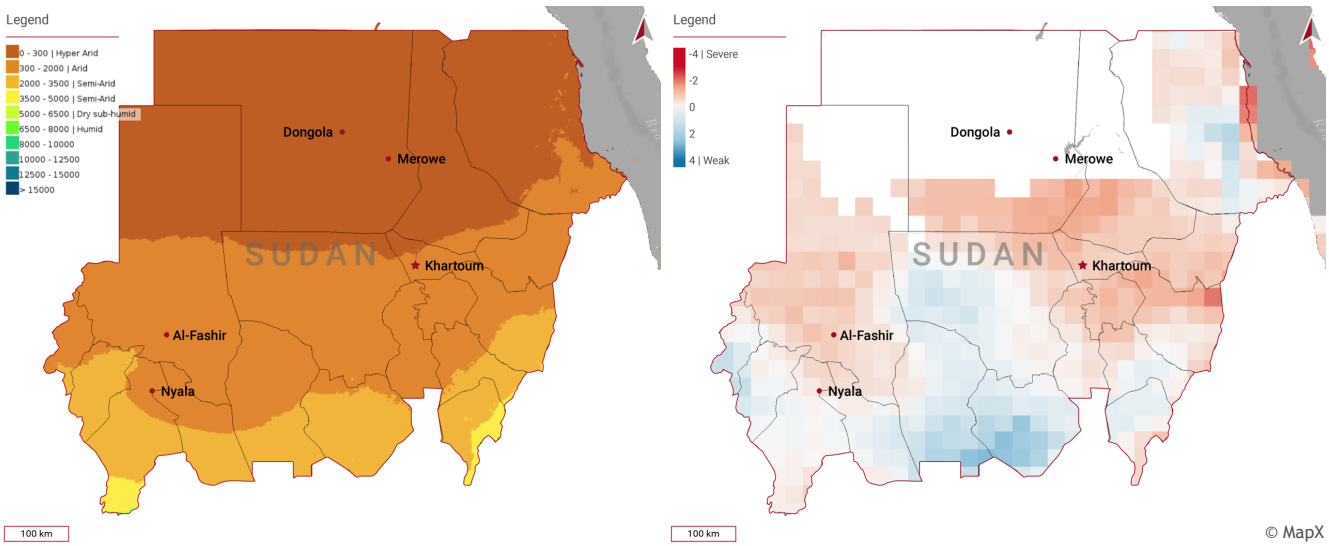
Although the current political and security environment in Sudan is more promising than in the past, the gains in stability need more effort and time. Since the ousting of al-Bashir, Sudan's government has lifted several travel restrictions, thus easing the delivery of humanitarian aid across the country, including to areas controlled by rebel groups (UN OCHA, 2020a: 40). The new government has also been reaching out to rebel groups through peace dialogues, although disputes remain over concessions and power-sharing arrangements (Deutsche Welle, 2020). Yet the situation remains fragile, threatened by political instability and continued military interference in civilian matters (Abbas, 2020; Walsh, 2020). Moreover, the COVID-19 pandemic may further exacerbate Sudan's security threats, disrupt ongoing peacekeeping operations and worsen livelihoods and food insecurity (Herrmann, 2020), while at the same time create a void for rebel groups to step in and garner public support by providing much-needed medical assistance (Alamin and El Wardany, 2020).

CLIMATE CONTEXT

Current and historical climate situation

Sudan's climatic conditions are diverse but dominated by arid and semi-arid ecosystems, which make up more than 80% of the country's area (GoS, 2016: 3; see Figure 3). The southern regions of the country also feature low rainfall savannah with small montane vegetation areas. Average annual temperatures vary between 26°C and 32°C across the country, with summer temperatures in the north often rising above 43°C (World Bank, 2020b). Historically, temperatures have been on the rise, warming by 0.8–1.6°C from the 1960s up to the first decade of the 21st century (World Bank, 2020b). This warming was accompanied by an increase in the likelihood of drought events (World Bank, 2020b), particularly in the regions of Darfur, Kordofan and central Sudan (USAID, 2016; see also Figure 3).

Figure 3: Aridity (left) and drought severity (right) in Sudan. Aridity, specifically the Global Aridity Index, is shown here as the annual average for 1970–2000.[4] Drought severity, specifically the Self-calibrating Palmer Drought Severity Index (scPDSI), is shown here as the average for 2010–2018.[5]



4 The Global Aridity Index is based on the Global-Aridity_ET0 dataset from the Consortium for Spatial Information of the Consultative Group for International Agriculture Research (CGIAR-CSI). These values show the amount of moisture that is available for potential reference vegetation growth, with lower values indicating more arid conditions, and higher values indicating more humid conditions. Map was generated on 14.08.2020 using MapX with own elaboration. Data source: Trabucco and Zomer (2018).

5 The scPDSI is based on dataset by the Climate Research Unit (CRU), University of East Anglia. The Index indicates the degree of drought severity based on time series data on precipitation and temperature, as well as fixed soil/surface parameters, with negative values indicating higher severity. Map was generated on 14.08.2020 using MapX with own elaboration. Data sources: (1) van der Schrier et al. (2013); (2) Barichivich et al. (2018).

Rainfall varies from north to south, ranging from near zero in the north to between 200 – 700 mm in the central regions, and exceeding 1,500 mm in parts of the south (World Bank, 2020b). From 1941 to 2000, average annual rainfall decreased at a rate of around 0.5% per year, while rainfall variability (and thus unreliability) increased, especially in the arid north (World Bank, 2020b). It should be noted that rainfall patterns vary across regions depending on the season: in the northern- and southernmost regions, rainfall levels have increased by 20 – 30 mm per decade during the dry season, whereas in other locations, particularly in Darfur, rainfall levels have been decreasing by 10 – 30 mm per decade during the rainy season (World Bank, 2020b). At the same time, the frequency of flooding events has risen, but this trend has been less predictable than that for droughts (USAID, 2016).

Climate change projections and key impacts

Warmer temperatures are expected in Sudan in the coming years. In general, average annual temperatures are projected to rise by 0.5 – 3°C by 2050, with more extreme increases in the north (World Bank, 2020c). Such a rise in temperature, which is higher than the global average, will likely entail an increase in the intensity and duration of droughts and heatwaves (Osima et al., 2018).

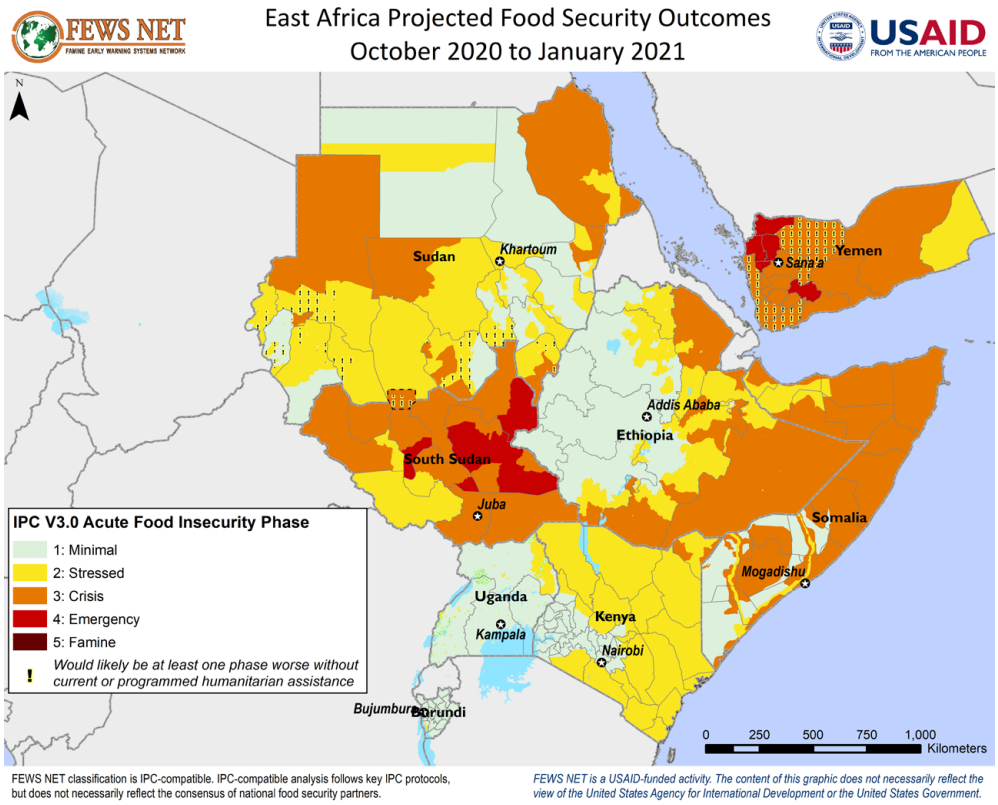
At the same time, it is likely that rainfall levels will continue to decrease throughout the country, but precipitation projections are generally more uncertain than temperature projections (Osima et al., 2018). However, there is more consistency in projections indicating an increase in variability and unpredictability in seasonal rainfall (World Bank, 2020c).

These climate impacts will likely exacerbate desertification in Sudan, which is already considered one of the country's greatest environmental challenges (Saad et al., 2018). The Sahara Desert in the country's north is expected to continue advancing southwards at a rate of around 1.5 km per year if current rainfall trends continue (USAID, 2016). Further desertification could threaten some 25% of Sudan's agricultural land, resulting in a significant drop in food production of around 20% (Saad et al., 2018).

Agriculture and livestock are thus some of the most vulnerable sectors to climate change impacts in Sudan (GoS, 2007). Increases in flooding events could further damage crops, agricultural land and related infrastructure already suffering from droughts and desertification (Siddig et al., 2018). Moreover, locust infestation of crops, which has been linked to areas already experiencing desertification (Eltoum and Dafalla, 2014), could further disrupt Sudan's already vulnerable food production.

This would have negative consequences for the country's food security, which is already under stress or in crisis in large parts of the country (see Figure 4). It could also drive further displacement and related conflicts as farmers and pastoralists compete over dwindling resources (Siddig et al., 2018). Rural communities in the north are expected to be hardest hit from the impacts of climate change, driving rural-urban migration that may overstrain available services (Siddig et al., 2018).

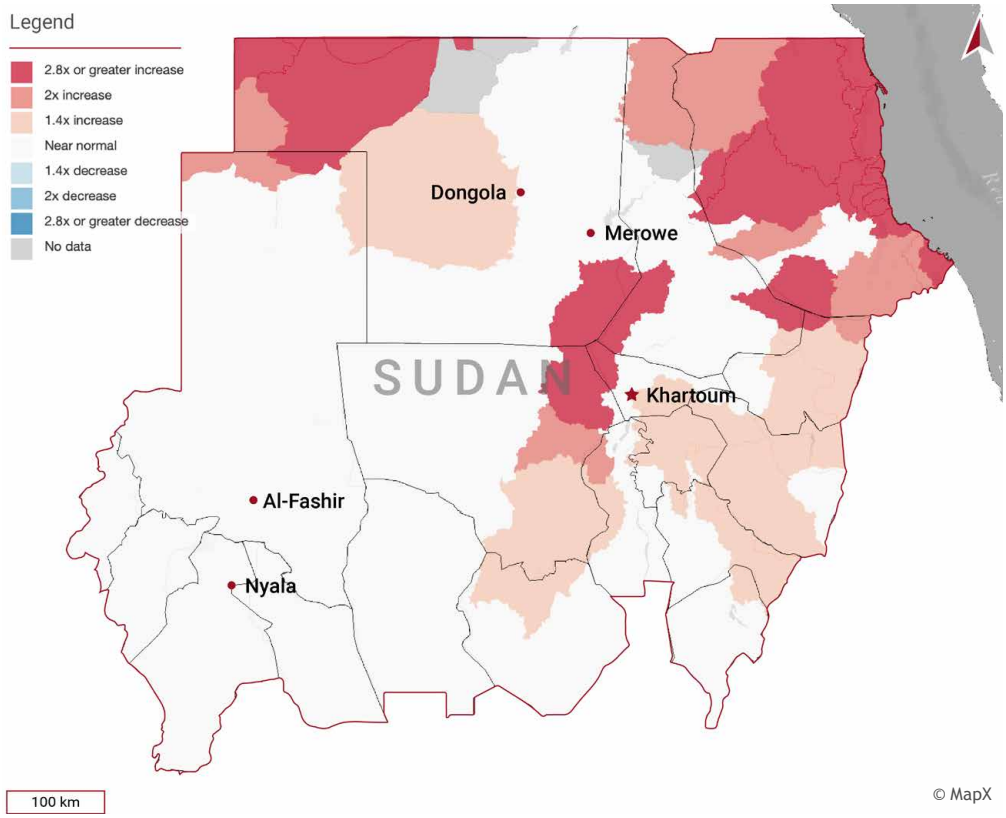
Figure 4: Projected food security outcomes for the East Africa region for the medium term, i.e. October 2020 – January 2021.[6]



6 **Food security classification is based on the Integrated Phase Classification (IPC). For more information, see FEWS NET (2020):** https://fews.net/fews-data/333. Map source: FEWS NET (2020).

Another important yet vulnerable sector to climate change is water. A projected increase in evaporation caused by rising temperatures will reduce water supply and access, as well as river discharge and groundwater recharge, leading to reduced water availability for irrigation, drinking and sanitation (GoS, 2007; Siddig et al., 2018). This increase in water stress will be greatest in the northern and eastern parts of Sudan, as well as the regions around Khartoum (Figure 5).

Figure 5: Projected changes in water stress in Sudan for the year 2030 under the Representative Concentration Pathway (RCP) 4.5 climate scenario.[7]



Reduced water availability could also disrupt Sudan's energy sector, as more than half of the country's electricity is derived from hydropower (Nexus - Water, Energy & Food Security Resource Platform, 2018). Although only a third of the population has access to electricity, demand is expected to grow along with a rising population, with access disproportionately higher in urban areas (70%) compared to rural areas (22%) (Nexus - Water, Energy & Food Security Resource Platform, 2018). Thus, a combination of both shrinking water resources and growing urbanisation and electricity demand could exacerbate Sudan's overall energy insecurity.

Climate change impacts could also leave Sudan's public health sector more vulnerable. Exposure to vector-borne diseases such as malaria could significantly increase under current climate change projections, which would add more strain on the country's healthcare system (GoS, 2007). Rising flood risks could also exacerbate the spread of water-borne diseases, while at the same time cause considerable damage to healthcare infrastructure (GoS, 2016). These threats manifested themselves recently in September 2020 when floods hit several regions across Sudan, during which health authorities and humanitarian aid organisations had to (and

7 Water stress is defined as the ratio of water withdrawal to supply. Map was generated on 14.08.2020 using MapX with own elaboration. Data source: Luck et al. (2015).

continue to, at the time of writing) address the healthcare needs of both flood victims and COVID-19 patients simultaneously (UN, 2020). While the floods exemplify the increasing risks that climate change pose to public health, it also highlights the fragility of Sudan's healthcare system in coping with converging crises.

Climate fragility risks in Sudan

0.5-0.3°C increase in average annual temperature by 2050

Increased intensity and duration of droughts and heatwaves

Increased desertification and southward expansion of Sahara desert

Increased variability and unpredictability in seasonal rains

Key climate impacts:

Agriculture

- Increased crop and land damage by droughts and floods
- Locust infestation on crops
- Increased competition between farmers and pastoralists over dwindling resources

Water

- Increased flooding events
- Reduced river discharge and groundwater recharge
- Reduced water availability for irrigation, drinking and sanitation

Energy and infrastructure

- Reduced hydropower potential
- Disaster-related infrastructure damage

Health

- Increased exposure to vector- and water-borne diseases
- Increased burden on healthcare systems
- Disaster-related damages to healthcare infrastructure

Sources: Eltoum and Dafalla 2014; GoS 2007; Osima et al. 2018; Siddig et al. 2018; USAID 2016; and World Bank 2020c, adapted by adelphi

CLIMATE-FRAGILITY RISKS

Because the interlinkages between environmental stress and political contestation are particularly visible in Sudan, the conflict in Darfur has sometimes been described as the first 'climate war'.[8] The term 'climate war' implies a direct causal link between climate change and violent conflict, based on a simplistic understanding of the interactions between the two.

Newer research and analysis, however, have moved beyond such causal models and clearly show that climate change, particularly changes in natural resource availability and access, do not directly or automatically lead to conflict or any specific social and political outcomes. Rather, other important contextual factors and drivers such as marginalisation, a history of conflict and failures in governance play an important role. This is also the case in Sudan.

In short, climate-fragility risks undermine human security in Sudan and contribute to conflict through three interlinked mechanisms:

1. First, conflict can result directly from increased competition over ownership, use of and access to natural resources;
2. Second, the displacement and loss of livelihoods resulting from climate change and conflict can lead to maladaptation and more tensions and conflict, further undermining the resilience of local communities;
3. Third, inadequate responses to environmental degradation, climate change and multi-dimensional conflict can undermine the government's legitimacy and capacity, subsequently feeding into opposition.

8 See for example former UN Secretary-General Ban Ki-moon's article: https://www.un.org/sg/en/content/sg/articles/2007-06-16/climate-culprit-darfur.

Increased competition over natural resources

Most Sudanese citizens depend on agriculture for their livelihoods, with the agricultural sector accounting for almost half of the labour force (FAO, 2020). Hence, the livelihoods and food security of many Sudanese are directly dependent on the climate, particularly on rainfall and its associated drought and flooding risks. Whereas vulnerabilities are greatest for rain-fed agriculture, they are also relevant for irrigated areas where insufficient productivity, combined with limitations on the amount of land that can be irrigated, persists.

With the natural resource base shrinking due to a combination of climate impacts, environmental degradation and a growing population, there is considerable pressure on land and water resources, heightening competition and tensions between communities. As crop yields shrink temporarily or permanently, farmers are pushed to expand the land under cultivation, damaging fragile ecosystems and encroaching on land traditionally used for pasture. Likewise, seasonal lack of water or absence of suitable grazing areas often drives pastoralists into farmland, or pushes them to cross farming areas too early in the season before harvests have been collected, resulting in crops being damaged by livestock.

As a result, farmer-pastoralist conflicts in various parts of Sudan have increased over the past few decades, and have often been intertwined with tribal and ethnical tensions – sometimes referred to as a clash between 'Arab' pastoralists and 'non-Arab' farmers (Ahmed, 2012; Gramizzi and Tubiana, 2013; Sørbø, 2012). Such distinctions, however, are not always clear-cut, as these conflicts are often more complex, dynamic and multi-layered, with various contested customary and formal institutions at play (Bromwich, 2018). Furthermore, ethnic identities have frequently been used by the central government and armed groups as a political tool to garner support, recruitment and ethnically motivated violence. These political strategies escalate conflicts beyond the question of resource scarcity and competition into one that is more ethnical and political in nature (El Amin, 2016; Gramizzi and Tubiana, 2013; Hassan and Kodouda, 2019).

A notable factor behind these conflict dynamics is the lack of a clear regulatory framework that would clarify land tenure rights and demarcate livestock routes (El Amin, 2016). Policies on nationalisation and the sale of land for mechanised agriculture, which were introduced in the 1970s, 90s and as recent as 2013, often favoured investors from Khartoum or outside of Sudan at the expense of local communities, thus aggravating these pressures further (Babiker 2018; Elhadary and Abdelatti, 2016). Likewise, the central government's imposition of environmental regulations to manage natural resources often excluded and even diminished much of the local resource management systems that were already in place.

As such, these policies and investments often undermine local livelihoods, particularly of pastoral communities, by changing customary land use rights and traditional conflict resolution mechanisms (Babiker, 2018; El Amin, 2016; Elhadary and Abdelatti, 2016). Moreover, such investments at times undermine food security in the target region because outside investors often grow crops for the international market rather than for local needs (Komey, 2012). These challenges have a long history: for example, the misuse and overuse of land and water resources in the Savannah Belt regions of Sudan by investors during the 1970s and 80s led to the deterioration of natural resources and subsequent competition and conflicts in the area, with consequences that continue to be felt to the present day (Ahmed, 2016).

Displacement and loss of livelihoods can lead to maladaptation, tensions and conflict

The loss of livelihoods, migration and displacement driven both by conflict and climate change can lead to different risk dynamics that further undermine the resilience of communities. Migration and displacement compound resource pressure in receiving areas, contributing to the types of resource conflicts described above.

Agricultural communities are particularly hard-hit, as climate and conflict impacts push farmers and herders to adapt by expanding or changing resource use, or by moving to other areas. Farmers are often pushed to use natural resources intensively and unsustainably, for example by using ill-suited crop production methods, which are insufficient for sustaining their livelihoods in the long run. Compounding these challenges are poor access to finance and agricultural extension services, including the lack of provision of agricultural inputs and veterinary support.

In the context of widespread poverty and a lack of alternative employment opportunities, people are also compelled to take up other unsustainable livelihood strategies that further undermine their resilience. For example, many IDPs as well as pastoralist groups in Darfur have resorted to charcoal production to adapt to the region's conflicts (UNEP and HCENR, 2020). This strategy, however, is a major cause of deforestation and environmental degradation, particularly in Sudan's north and in areas surrounding urban centres where resource pressure is greater (UNEP and HCENR, 2020). The risks of renewed conflicts are especially high in north-south border regions, where timber exploitation by the north's charcoal industry encroaches on the forests of southern regions (UNEP, 2007).

Another form of maladaptation that has played a key role in the political economy of Sudan's conflicts is artisanal gold mining. Because of its low barriers to entry and lucrative prospects, the industry is highly attractive and accessible to people living in poverty (Siegel and Veiga, 2010). The economic importance of gold increased especially after the split of South Sudan, when the government actively sought other strategies to make up for losses in oil revenues (UNEP and HCENR, 2020). To control gold revenues, however, the government had to cut deals with armed groups who controlled many of these gold mines (De Waal, 2019). This has led to the empowerment and political financing of many armed groups, particularly the RSF, thus fuelling the ongoing conflicts and power struggles between them over access to these mines (De Waal, 2019). At the same time, artisanal gold mining undermines the resilience of local communities by contributing to environmental degradation and health problems, for example, through the use of toxic substances such as mercury during the gold extraction process (Amin, 2018; Khalid et al., 2018; Tayrab et al., 2016).

Climate and conflict dynamics have also become a major push factor for rural-urban migration. Mass migration to Khartoum and the subsequent expansion of the city's informal settlements have occurred following periods of desertification in the 1970s and 80s (Steel et al., 2019). More recently, these urbanisation patterns increased again as a result of civil wars and conflicts in the past two decades, most notably the conflicts in Darfur, Blue Nile and South Kordofan that resulted in mass movements of IDPs to the capital (Three City Land Nexus Research Team, 2020). Coupled with Khartoum's high population growth rates and the government's assertive urban redevelopment policies, demand for land, and thus land prices, has increased significantly (Steel et al., 2019; Three City Land Nexus Research Team, 2020). In some cases, policies of forced evictions and demolition of squatter settlements as part of the government's urban redevelopment plans have led to violent clashes between local authorities and residents (Omer, 2018). This increasing pressure over urban land may further enforce patterns of spatial segregation and social exclusion (Steel et al., 2019), thus potentially feeding into anti-government sentiments. More generally, people living in the rapidly growing informal settlements are disproportionately vulnerable to weather extremes and livelihood insecurity.

Inadequate responses undermine government legitimacy and capacity

As discussed above, climate change is exacerbating a number of conflict and risk dynamics in Sudan, particularly around natural resources and livelihood insecurity. If the government fails to respond to and adequately address the interlinked risks of environmental degradation, climate change and conflict, it will undermine its own legitimacy as well as that of traditional authorities, while simultaneously strengthening the legitimacy of armed groups. Thus, these impacts can fuel the very mechanisms that have played a key role in the conflicts that Sudan has experienced.

A large part of these anti-state grievances stem from the top-down, interventionist policies of the former al-Bashir regime. Among these were the government's assertive attempts to control land resources – through, for example, land reformation and nationalisation – which stripped many local communities of their land rights, thus triggering a sense of marginalisation among the communities affected (Komey, 2012). Furthermore, the government's interventions to restructure traditional land management institutions and conflict resolution mechanisms have reduced the communities' adaptive capacity to resolve disputes, while at the same time reducing the legitimacy of these local institutions (Unruh and Abdul-Jalil, 2012).

These experiences are part of the context for anti-state sentiments among local and peripheral communities. Although a new civilian government has been in place since the ousting of al-Bashir in 2019, the failure to address the economic hardships brought about by these challenges remains a major obstacle for the government to gain legitimacy (Hassan and Kodouda, 2019). On the other hand, it provides a window of opportunity for armed groups to capitalise on public grievances to increase their support base and activities on the ground. This has been evident, for example, during the COVID-19 pandemic: several groups have attempted to leverage the health crisis to gain public support by offering much-needed medical assistance, against the backdrop of a weakened national healthcare system (Alamin and El Wardany, 2020).

ENTRY POINTS FOR ADDRESSING CLIMATE-FRAGILITY RISKS

More than 40% of Sudanese citizens depend on agriculture for employment. Climate change and climate variability are putting many of these livelihoods under significant pressure. At the same time, competition over natural resources and livelihood insecurity are at the heart of many conflict and risk dynamics in Sudan, and threaten to further undermine the relationship between the government and its citizens. The transition towards more democracy is an opportunity to build a more sustainable future for Sudan's population and to address many deep-seated grievances. Meanwhile, the COVID-19 pandemic, the ongoing political instability and deep economic problems threaten Sudan's ability to peacefully manage the additional pressure of climate change and its complex interactions with Sudan's risk landscape.

There are two broad but interlinked levels of entry points for addressing climate-fragility risks in Sudan: the first is to improve capacities to cope and adapt to climate and environmental change, particularly with regard to water and agriculture; the second is to improve the management of its knock-on effects, in particular livelihood and governance challenges. Both levels are closely intertwined as these effects are interdependent and stakeholders often overlap, but they offer two conceptually different though complementary approaches. Although specific needs vary locally and will need to be assessed in partnership with local stakeholders, there are a number of entry points for addressing climate-fragility risks:

➲ Water management

Water is a key resource and source of friction. Access to water can be a source of peace around which community stabilisation takes place, but the widespread tapping of groundwater resources in Sudan needs to be driven by sustainable recharge levels and a better understanding of demand. Entry points could therefore include:

- improving water infrastructure, for example boreholes or water retention structures;
- improving water management and governance;
- research and monitoring of water availability, especially regarding groundwater.

Land management, rehabilitation and ecosystem restoration

Land degradation is pushing farmers into expanding cropped areas and thus often into rangelands, while driving pastoralists into farmed areas. This is a key driver of conflict, especially where it occurs before harvests. Simultaneously, ecosystem degradation is contributing to the migration to urban centres and Khartoum in particular, with cities struggling to provide adequate services and livelihoods. Entry points could include:

- reforestation and protection of forests to stop and reverse land degradation and desertification;
- protection and cultivation of rangelands, for example through seeding, fire control, and the provision of water and alternative sources of fuel;
- reclamation of degraded land;
- supporting REDD+ activities,[9] as well as local community forestry programmes.

Agricultural support

Against the backdrop of increasing pressures on natural resources, farmers need to be able to sustain better livelihoods with less land and fewer animals. To help them increase productivity and avoid pushing them into vulnerable marginal lands or to take up unsustainable livelihood strategies, entry points could include:

- applied research, agricultural extension services and training;
- veterinary support to facilitate limiting the number of animals while increasing value.

Community stabilisation and peacebuilding

In order to prevent changing resource access and availability from feeding into conflict, mechanisms for conflict prevention need to be established and strengthened. These could potentially include:

- livestock route demarcation;
- joint management of water infrastructure such as water points;
- support for peace committees and community-level conflict resolution mechanisms.

Livelihood support

Agriculture is the backbone of most livelihoods, but livelihoods need to diversify to increase resilience. It is key to ensure that livelihood support reaches the most vulnerable and marginalised groups. Entry points could include:

- vocational training to respond to youth unemployment; ensuring that coping mechanisms do not undermine the natural resource base (e.g. cutting forests or polluting water through artisanal mining);
- micro-loans, cash transfers and feed provision to prevent asset depletion during periods of stress, and financial mechanisms for facilitating investments by farmer groups;
- improving the marketing of agricultural commodities so as to equip farmers with the financial means to improve their livelihoods.

Governance

To safeguard local progress towards improved natural resource management and extend good practices across the country, the policy environment needs to be improved across all scales, from community and local to state and national level. This cross-cutting challenge links back to, but also goes beyond, the sectoral entry points above and includes:

- land tenure rules and access rights especially for both farmers and pastoralists, for example, by developing a national land use map and improving co-management and

9 In January 2020, Sudan submitted its first Forest Reference Level documentation to the UN Framework Convention on Climate Change (UNFCCC) as part of the UNFCCC's 'Reducing Emissions from Deforestation and Forest Degradation in Developing Countries' (REDD+) strategy in promoting national forest management and climate change adaptation and mitigation activities (GoS FNC, 2020).

legal frameworks for land investments, to ensure they align with the concerns and needs of the local communities;

- strengthening commitment to investment into productive sectors (especially agriculture, including husbandry) at the federal level;
- access to climate information and early warning systems, including awareness-building, as well as disaster risk reduction management, for example by establishing state-level bodies for natural resource planning;
- strengthening of environmental knowledge, capacity and governance structures at the local, state and federal levels, and promoting sustainable, community-based natural resource management.

In short, activities around natural resources and building more resilient livelihoods need to be buttressed by broader governance improvement, including land tenure governance, and support for environmental knowledge and governance structures at state and local levels.

Moreover, these efforts need to be used to give voice to and strengthen the capacity of particularly vulnerable groups. Empowerment should prioritise, for example, **women** in their gendered roles relating to natural resources, and **youth** for whom training can help provide livelihoods. In this regard, the Sudanese government has indicated its support, as women and youth empowerment in natural resource management and climate change adaptation and mitigation processes are mentioned in several UNFCCC-related documents and submissions.[10] The important roles of women and youth are also highlighted in several studies (e.g. Ahmed, 2016), although the recent State of Environment and Outlook Report by UNEP and HCENR (2020) emphasises the need for more political engagement with as well as financial and institutional support for these groups.

Finally, these activities should be accompanied by local academic research both to ensure that local and indigenous knowledge is leveraged and to facilitate the spread and sustainability of such efforts.

In identifying this broad range of entry points, it is critical to emphasise that individual actions by themselves do not make for an integrated approach. If undertaken in isolation, many of these entry points will not be very helpful and could sometimes even be counterproductive. Providing better access for one community or occupational group without delivering benefits for the other can aggravate tension, for example. Similarly, attempts to protect and restore the natural environment will only succeed if there is community awareness and, ideally, tangible incentives for contributing, and if such efforts seek to draw on indigenous knowledge. Therefore, all interventions should be deliberately leveraged to bring communities together. Livestock route demarcation, for example, should not only or even primarily be seen as an objective, but also as a means for building trust and peace dividends.

10 See for example, (1) Sudan's Intended Nationally Determined Contributions (INDCs), which was submitted to the UNFCCC in 2015 (GoS, 2015), and (2) Sudan's submission to the UNFCCC Conference of the Parties (COP) Decision 23/CP.18 on "Promoting gender balance and improving the participation of women in UNFCCC negotiations and in the representation of Parties in bodies established pursuant to the Convention or the Kyoto Protocol" (GoS, 2013).

In sum, building resilience to climate-fragility risks in Sudan should encompass the following elements:

- activities should consciously seek to avoid or attenuate trade-offs between climate change adaptation and peacebuilding objectives and look for co-benefits across the two areas;
- to that end, activities should seek to link improvements in (the use of) the natural resource base, with efforts to improve the governance of competing interests, leveraging technical interventions for building peace and cooperation and for improving equitable use;
- to achieve such outcomes, all relevant communities and stakeholders need to be part of the planning process, and need concrete incentives that correspond to their needs;
- awareness-building, access to information and evidence-based policy-making are essential;
- gender and social inclusion, particularly women and their roles in natural resource management and conflict resolution, as well as youth should be an integral part of these activities;
- although natural resource management is key, links to broader livelihood support and policy improvements can improve the effectiveness and sustainability of activities;
- the link between local activities and feedback into state and national policies is critical for sustainability and potential upscaling, making capacity-building a key lever.

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