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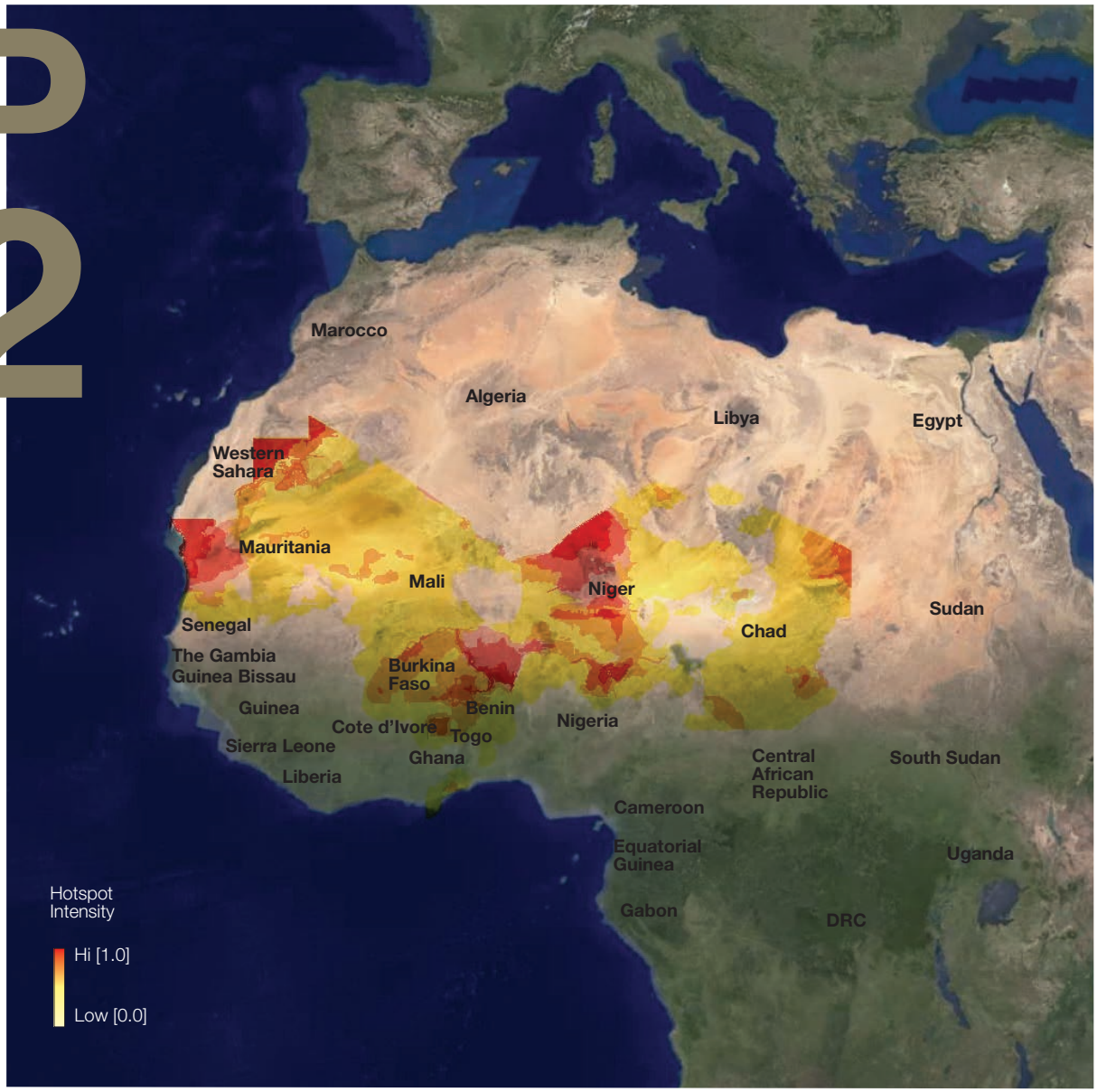
SP 52

STRATEGIC PAPER 52

FEBRUARY 2021



CLIMATE CHANGE AND SECURITY IN WEST AFRICA

Peter Schmidt and Robert Muggah

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CLIMATE CHANGE AND SECURITY IN WEST AFRICA

Peter Schmidt and Robert Muggah[1]

Introduction

The Intergovernmental Panel on Climate Change (IPCC) warns that climate change will generate alarming consequences for West Africa. A rise in global temperature between 3°C to 6°C by the end of the century (or earlier) is associated with greater irregularity in rainfall, and a delay in the beginning of the rainy season.[2] Another risk involves higher frequency of extreme weather events such as heat waves, droughts, rainstorms, and flooding. According to some models, sea levels could rise by more than 75cm on average by the end of the century, forcing hundreds of millions of people to move, mostly within their own countries, and often to cities.[3] [4]

West Africa, and the Sahel in particular, are believed to be exceedingly sensitive to climate change. That said, data quality and forecasting are uneven.[5] There is detailed statistical information on temperature fluctuations and patterns of rainfall in countries north of the Gambia, but similar data are sparse to the south. Notwithstanding the variability of data availability and quality, the relationships between the region's changing climate, disruption of livelihoods and migration, deepening food insecurity, social unrest and violence are difficult to ignore.

This report provides a short summary of several actual and potential threats of climate change on security in selected areas of West Africa. It serves as a background paper for the preparation of a data visualization that will be disseminated to United Nations member states in late 2020. The paper is not designed

1 Peter Schmidt and Robert Muggah were responsible for authoring this paper. Thanks to Caio Cotta Pereira for inputs. Special appreciation also for Adam Day, Sascha Fong, Janini Vivekananda, and Karim Soumana for their substantive inputs. Credit is due to Switzerland and Germany for their financial assistance. All errors and omissions are the fault of the authors.

2 Seneviratne et. al., 2018. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp: 109-230.

3 Matteo Fagotto, 2016. West Africa is Being Swallowed by the Sea. Foreign Policy.

4 World Bank, 2018, "Groundswell: Preparing for Internal Climate Migration", World Bank Group.

5 Sultan, B., and Gaetani, M., 2016. "Agriculture in West Africa in the Twenty-First Century: Climate Change and Impacts Scenarios, and Potential for Adaptation." Frontiers in Plant Science.

to be comprehensive, but rather to inform the production of a shortlist of data "layers" that will be featured on the EarthTime platform, an initiative of Carnegie Mellon University's Create Lab. Among the findings of this paper are:

- **Coastal populations are facing increased risk of sea-level rise**: In a region with forecast sea-level rise considerably above the global average, between 72 to 94 million people will inhabit several of West Africa's low-lying urban centers by 2050, with the largest clusters in Lagos, Abidjan, Dakar and Accra.

- **The economic impacts of associated coastal flooding, salinization and land degradation are far-reaching:** In 2017, the cost of environmental degradation (COED) inflicted by rising sea-levels in Senegal, Togo, Benin and Cote d'Ivôire totalled $3.8 billion, or 5.3% of those countries' combined GDP.

- **Global warming and acidification threaten the region's fisheries, with implications for employment and food security:** Warming temperatures and sea-water acidification threaten to reduce by 30% or more the maximum catch potential of fishing in the region. Fishing constitutes 30% of the protein intake and supports 16% of the region's protein intake.

- **Increasingly variable and unpredictable wet and dry seasons affect pastoralists and contribute to increased risk of violent disputes:** The intensification of drought risks in West Africa has disrupted the region's nearly 20 million pastoralists, contributing to a five-fold increase in conflict in Mali's Mopti region over two years.[6]

- **Seasonal fluctuations in water availability in parts of the Sahel pose a major threat to already vulnerable populations, not least those dependent on subsistence agriculture:** Dramatic fluctuations in water availability, which have significant implications for populations dependent on rain-fed agriculture, especially in the Lake Chad Basin (LCB), threaten to disrupt the food security conditions for nearly 50 million people, of which 6.9 million are already severely food insecure.[7][8]

- **Accelerated desertification and rainfall variability, combined with pre-existing tensions among and between herders and farmers, is sparking violent disputes:** Desertification south of the Sahel is driving conflict between Shuwa Arabs and Fulani pastoralists around Lake Chad's Southern Basin. Irregular rainfall patterns in the Lake Chad Basin have created socio-economic shifts that have been linked to recruitment into Boko Haram and Islamic State.[9]

- **Uncertainty, disruption and deprivation associated with climate changes could contribute to increases in recruitment to non-state groups**: More than 64% of the population of West Africa is under 24 and 60% of the active labor force relies on subsistence agriculture. As livelihood opportunities dry up, the potential for the unemployed joining violent extremist groups is rising, as is the potential to join criminal organizations involved in trafficking, the black market and sex work.

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6 International Committee of the Red Cross, 2019. "Mali-Niger: Climate Change and Conflict Make an Explosive Mix in the Sahel."

7 Nagarajan, C., et al., 2018. "Climate Fragility Profile: Lake Chad Basin." Adelphi, Berlin.

8 Sultan, B., and Gaetani, M., 2016. "Agriculture in West Africa in the Twenty-First Century: Climate Change and Impacts Scenarios, and Potential for Adaptation." Frontiers in Plant Science.

9 Nagarajan, C., et al., 2018. "Climate Fragility Profile: Lake Chad Basin." Adelphi, Berlin.

- **Due to gendered differences in livelihood responsibilities and social roles, the harmful effects of climate change and violence affect women differently than men:** land access negotiations are more difficult for women agricultural workers in West Africa, who are the least likely in the whole continent to own land (8% hold land titles).[10] Additionally, since women also bear the responsibility of both household and pastoralism work, they tend to have less time to learn about raising new breeds of livestock which may be better suited to new ecological conditions.[11]

- **"Maladaptive" conflict-resolution initiatives run the risk of undermining climate resilience, while maladaptive climate-adaptation initiatives run the risk of unintentionally exacerbating conflict**: conflict-resolution projects in Nigeria such as Exercise Cat race and Operation Whirl Stroke have met with mixed results, with military operations failing to reassure communities afraid of returning to their villages. Another plan to establish "cattle colonies," ranch clusters with resource access and educational infrastructure, has been rejected in some states for its echoes of colonial land policy.[12]

A key take-away is that climate change is threatening food and water security, especially in a region that is already marked by hotspots of conflict, violence and fragility. Surges in organized political and social violence along the Mali-Burkina Faso border and in the Nigerian states of Zamfara, Adamawa, Benue and Kaduna (among others), together with

"Warming temperatures and sea-water acidification threaten to reduce by 30% or more the maximum catch potential of fishing in the region"

the spread of organized crime across the region, are persistent challenges. After a brief treatment of the conceptual framework, this paper focuses first on coastal threats due to sea surges and rising water levels in several countries of the Economic Community of West African States (ECOWAS) region. It then considers risks associated with transhumance and farmer-herder disputes in Burkina Faso, Mali and Niger, and concludes with a brief treatment of armed conflict and displacement in the Lake Chad Basin.[13] These three case studies will be featured in the aforementioned data visualization platform.

10 Bouchama et. al., 2018; cited in "Women and Climate Change in the Sahel." West African Papers. Organization for Economic Cooperation and Development, March 2020.

11 ibid

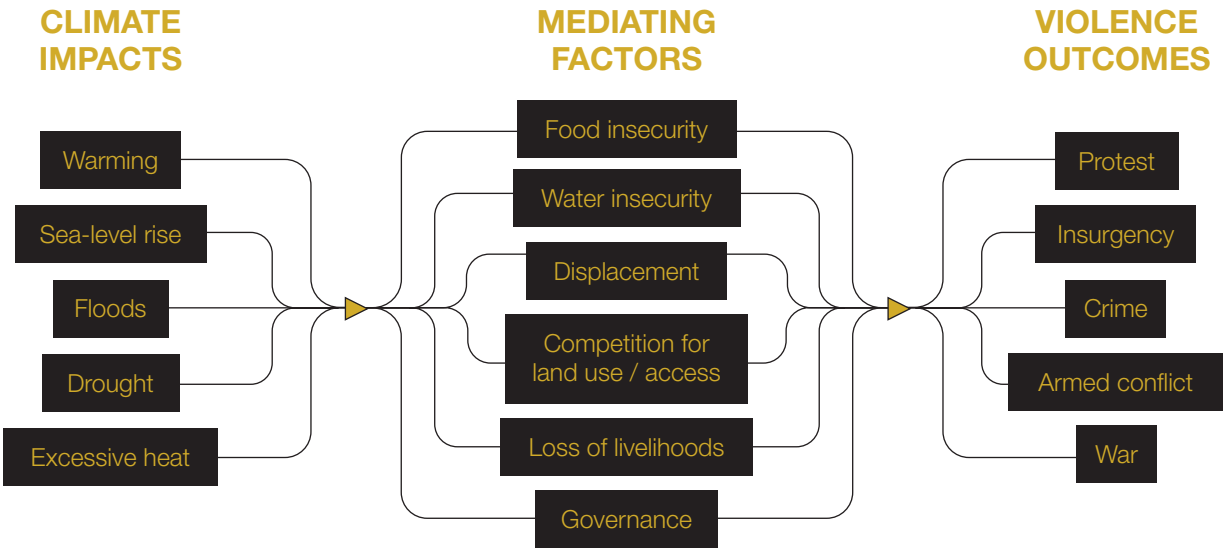
12 Crisis Group, 2018, "Stopping Nigeria's Spiralling Farmer-Herder Violence." https://www.crisisgroup. org/africa/west-africa/nigeria/262-stopping-nigerias-spiralling-farmer-herder-violence.

13 Findings from this assessment will inform the production of a short synthesis and a data visualization to be circulated among UN Security Council members in late 2020 and early 2021.

Conceptualizing climate and security relationships

Climate change is frequently described as a "risk multiplier". The link between climate change and violence, however, is not always fully theorized. This paper proposes a basic framework to examine possible associations between climate impacts, mediating factors, and violence outcomes. Examples of specific climate impacts include sudden changes in temperature, unusual fluctuations in precipitation and the onset and frequency of extreme weather events. These phenomena can in some instances exacerbate socio-economic conditions that may in turn precipitate a higher risk of violence onset. Examples of mediating factors include rising food insecurity, migration and displacement, urbanization, growing competition over pasture and arable land, and the presence or absence of governmental conflict-mediation and resource-allocation systems. These variables, depending on their intensity and duration, can increase the probability of violent outcomes on a scale from protests and riots to outright civil unrest and armed conflict (see Graphic 1).

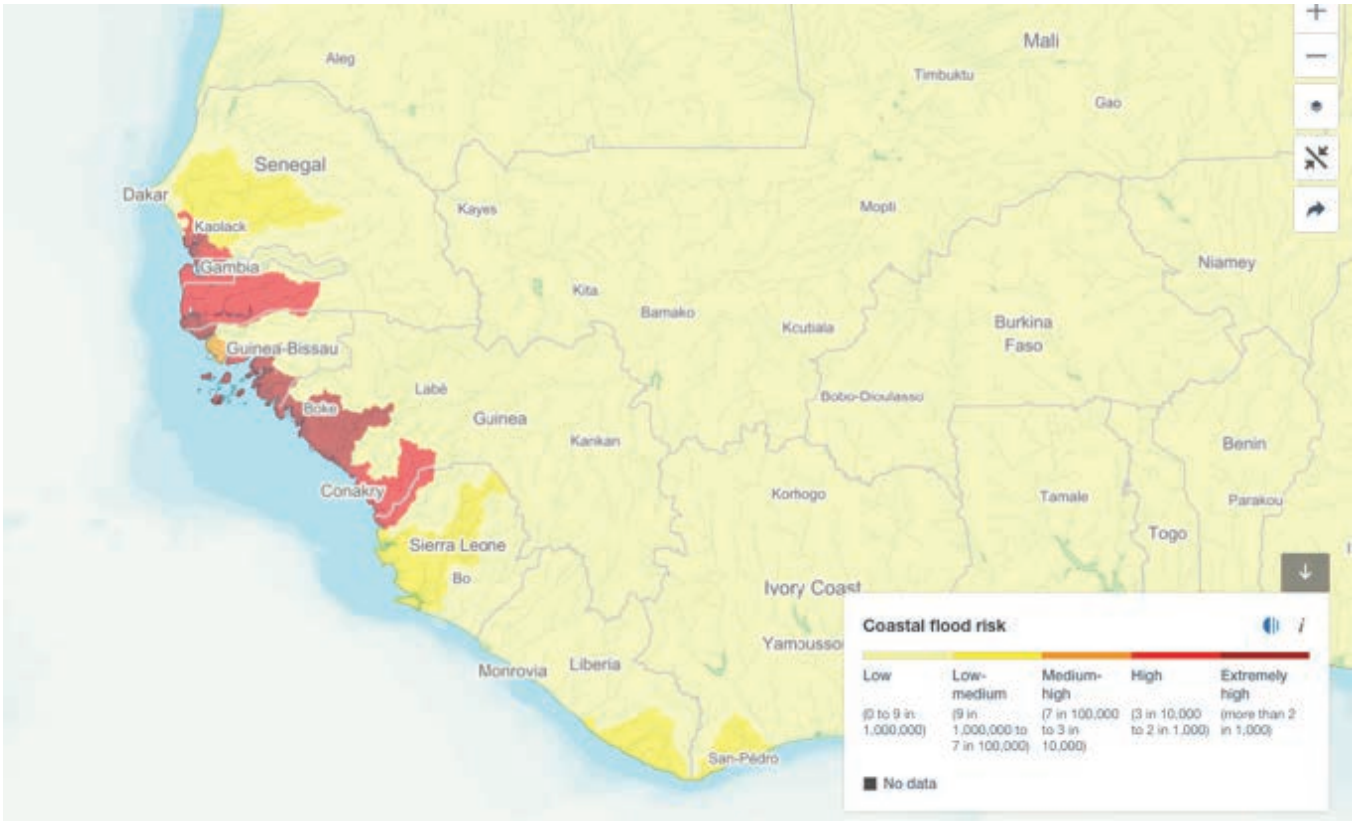
Graphic 1. Climate change as risk multiplier



There are complex relationships between climate impacts, mediating factors and violence outcomes. Graphic 1 provides a simplified shortlist of possible variables. Any single impact, or cluster of impacts, can contribute to violence outcomes—or not, depending on pre-existing mediating factors such as food insecurity, water insecurity and the coping capacity and resilience of communities and governments. The pathway is not linear, and it is the mediating factors, the independent variables, that are most likely to determine the character of instability.

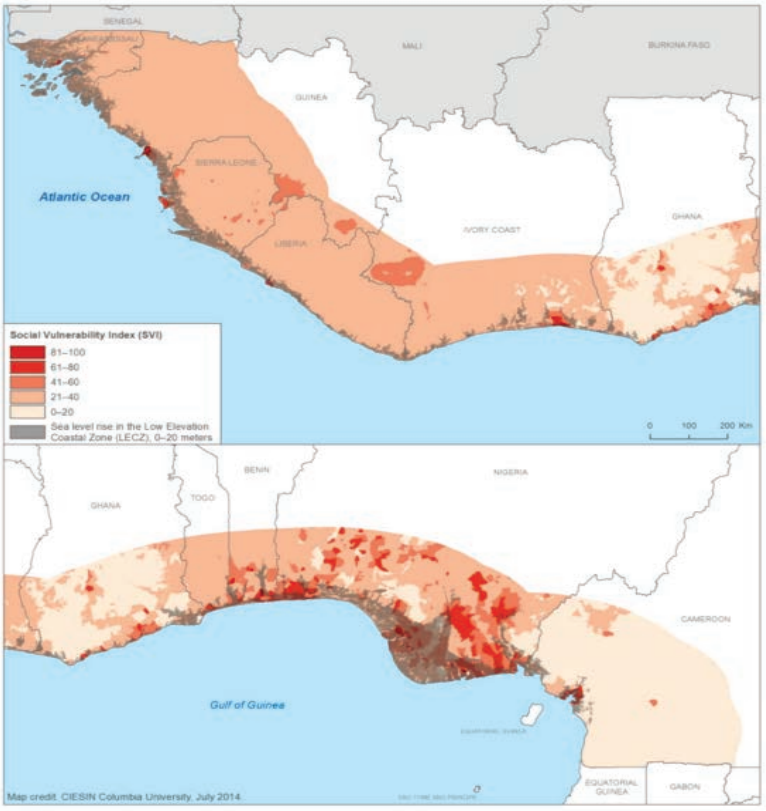
Indeed, it is not necessarily the case that rising temperatures, prolonged drought, or flash floods on their own will initiate protest, much less armed conflict. What matters are the ways in which these factors influence people's livelihoods, exacerbate inequality and reinforce real or perceived grievances between groups. There are also other structural factors that will likely shape the trajectories of violence, including regime type, the involvement of security forces, identity-based cleavages and the history of previous conflicts.

Figure 1. West Africa



Coastal threats in West Africa

Figure 2. Vulnerability index in West Africa[14]



Coastal areas are critically important to sustaining the livelihoods and food security of West Africans. Most of the population living in the ECOWAS jurisdiction – some 85% of the region's estimated 103 million people – is concentrated in the 12 coastal countries, and nearly half of West Africa's population lives

14 Retrieved from WRI Aqueduct Project. Filters: "Future"; "Business as Usual"; "Absolute Value"; "Seasonal Variability." Available at: wri.org/applications/aqueduct/water-risk-atlas

within 200 km of the ocean.[15][16] Coastal zones are critical sites that encompass wetlands, fisheries, oil and gas reserves and tourism. They are also rapidly urbanizing: annual urban population growth rates in the region are from 4.2% to 5.7% higher than the global average, and between 2015 and 2050 the proportion of the region's population living in cities will rise from 45.1% to 60.7%, driven in part by climate change.[17] [18] Due to their rapid urbanization, coastal areas are experiencing severe stress, including significant coastal retreat and soil degradation owing to over-use (see Figure 2). Erosion rates are particularly high in Benin, with an average annual loss of 4 meters of land along 65% of the coast.[19] Senegal suffered the highest economic blow, with coastal degradation costing the equivalent of 7.6% of the country's GDP in 2017.[20]

The West African coast between Mauritania and Nigeria is predicted to experience rates of sea-level rise considerably above the global average of 0.76 meters: the region's sea-levels could rise by up to 1.06 meters by 2100.[21] [22] This change, along with increased frequency of extreme weather events, is expected to result in accelerated coastal erosion; flooding of low-lying areas; increased elevation of storm surges as the frequency and intensity of extreme weather events increase; salinization of soil and water; degradation and modification of ecosystems; changes in groundwater levels; infrastructure losses; involuntary migration; reduced economic activity; and increased transmission of meningitis, cholera and yellow fever, among other impacts.[23] [24]

The region has already seen many of these changes: coastal erosion along Ghana's 580km coastline has caused more than half of the city of Keta to flee and has transformed the nearby coastal town of Fuveme into an island, forcing thousands of families to migrate to the mainland. In Senegal's UNESCO World Heritage city of Saint-Louis, rising seas have destroyed houses, flooded streets and damaged crops.[25] Not only coasts are flooding—in August and September of 2020, as many as 760,000 people were hit by severe riverine flooding, with as many as 111 resulting casualties.[26]

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15 The coastal states are: Benin, Cape Verde, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Senegal, Sierra Leone, Togo, and Nigeria.

16 The Importance of West Africa's Coastal Zones, 2013. , West Africa Coastal Climate Change National Adaptation Planning Workshop. Economic Community of West African States, Ghana.

17 Saghir, J., and Santoro, J, 2018. "Urbanization in Sub-Saharan Africa," CSIS. https://www.csis.org/analysis/urbanization-sub-saharan-africa.

18 UNU, 2020, Conflict Prevention in an Era of Climate Change. New York: UNU.

19 World Bank, 2018. "West Africa's Coast: Losing Over $3.8 Billion a Year to Erosion, Flooding and Pollution." https://www.worldbank.org/en/region/afr/publication/west-africas-coast-losing-over-38-billion-a-year-to-erosion-flooding-and-pollution.

20 ibid.

21 IPCC, 2014. "Synthesis Report Summary for Policymakers."

22 West African Coastal Areas Management Program (WACA), 2020, "Rising Tide: Protecting Vulnerable Coastal Communities in West Africa | WACA."

23 The Importance of West Africa's Coastal Zones, 2013. , West Africa Coastal Climate Change National Adaptation Planning Workshop. Economic Community of West African States, Ghana.

24 World Health Organization, 2008. "WHO | Floods in West Africa Raise Major Health Risks." https://www.who.int/mediacentre/news/releases/2008/pr28/en/.

25 JAhedor, J, 2019, "Sea-Level Rise: West Africa Is Sinking." Earth.org, https://earth.org/sea-level-rise-west-africa-is-sinking/.

26 Boureima, B., 2020. "Severe Floods Hit 760,000 People in West and Central Africa." Reuters. https://www.reuters.com/article/us-westafrica-floods-idUSKBN2613B5.

Africa's population in low-elevation coastal zones is rising at an annual rate of 3.3% between 2000 and 2030, more than double the global average rate.[27] Much of this growth is taking place in four of the subregion's largest cities—Lagos, Abidjan, Dakar and Accra (see Figures 3 and 4), all of which are coastal. Coastal population density is expected to increase significantly: demographers forecast that between 72 to 94 million people will inhabit West Africa's low-lying urban centers by 2050.[28] Meanwhile, roughly 5,500 km of the region's coastline could be severely degraded due to flooding associated with rising sea levels.[29]

This trend has already led to a significant number of deaths from flooding and contamination. For example, flooding and the diseases generated by associated degradation and effluent contributed to an estimated 13,000 deaths a year in Benin, Cote D'Ivoire, Senegal and Togo combined.[30]

"...flooding and the diseases generated by associated degradation and effluent contributed to an estimated 13,000 deaths a year."

27 Ahmadou Aly, M., 2020, "Confronting the Challenges of Climate Change on Africa's Coastal Areas." Brookings (blog).

28 Neumann, B. et al., 2015, "Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment." PLoS ONE 10, no. 3.

29 West African Coastal Areas Management Program (WACA), 2020, "Rising Tide: Protecting Vulnerable Coastal Communities in West Africa | WACA."

30 Lelia, C., Juan José, M., Maria S., 2019. The Cost of Coastal Zone Degradation in West Africa : Benin, Côte d'Ivoire, Senegal and Togo. World Bank, Washington, DC. World Bank.

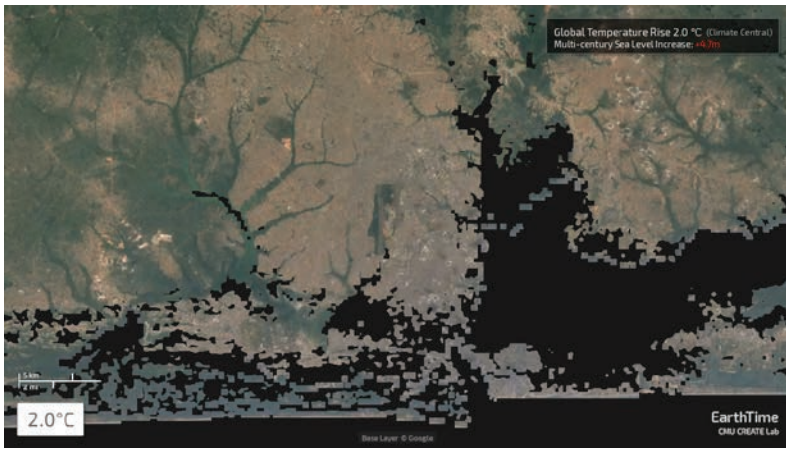
Figure 3. Forecast sea-level rise in West African cities[31]

Dakar 0º C

Lagos 0º C

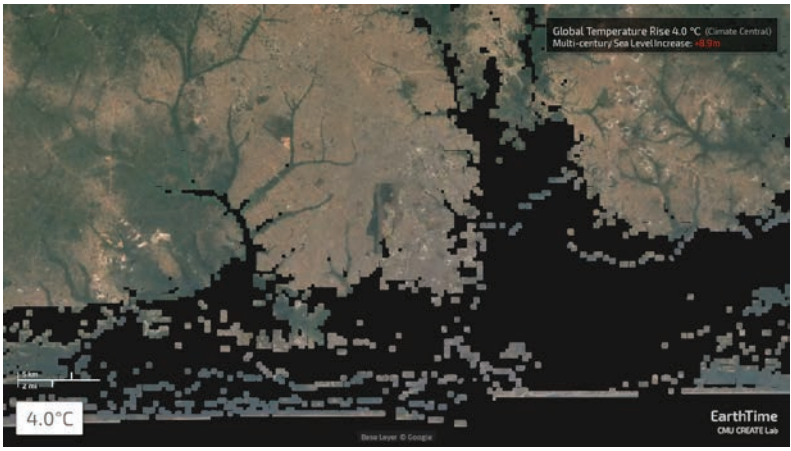
Dakar 2º C

Lagos 2º C



Dakar 4º C

Lagos 4º C



31 Retrieved from Earthtime. Filters: None; "Sea Level Rise due to 2.0ºC Increase"; "Sea Level Rise due to 4.0ºC Increase" Available at: https://earthtime.org/explore

Climate change will also severely disrupt coastal economies. Coastal cities and commerce are currently responsible for generating approximately 56% of the region's GDP.[32] Major ports and industrial facilities (see Figure 4) accounting for more than $150 billion in annual trade form the backbone of the national economies located within the coastal zone.[33] In addition, coastal agriculture produces between 9% and 67% of these countries' national GDPs, and tourism accounts for an average 2% of GDP.[34] In 2017 alone, the cost of environmental degradation (COED) in Senegal, Togo, Benin and Cote d'Ivôire totaled $3.8 billion, or 5.3% of those countries' combined GDP.[35]

Figure 4. Map of West African Ports[36]

These climate-driven changes pose a grave threat to food security. Fish protein constitutes more than 30% of the total protein intake in Senegal, the Gambia, Guinea, Sierra Leone, Cóte d'Ivoire, Ghana, Togo and Nigeria.[37] Additionally, 4.8 million people in West Africa, or 16% of the coastal population, rely on fishing to sustain their livelihoods.[38] Yet fishing across the region is threatened. As seawater warms, fish generally decrease in size and productivity, decline in number, and migrate from the region entirely. Increases in water temperatures, acidification and bleaching can alter fish (and other marine life) physiology, including size and reproductive capacity, thus lowering their market value.[39]

Models forecast that by 2050 the Maximum Catch Potential (MCP, or the maximum exploitable catch of a given species) could decline by 30% or more in the Gulf of Guinea region.[40] Additionally, warming waters can push species that constitute dietary staples to more temperate latitudes. In Senegal, for example, rising temperatures have already led to the northward migration of sardinella, the region's most important species in terms of economic value and food security.[41] Senegal's coastal town of Saint-Louis has experienced a significant decline in its annual catch: to 70,000 from 650,000 over the past five years. Fishermen are forced to cross the border into Mauritania to fish, which has led to violent exchanges between Senegalese fishermen and the Mauritanian coastguard.[42]

These pressures on key industries will also

32 Lelia, C., Juan José, M., Maria S., 2019. The Cost of Coastal Zone Degradation in West Africa : Benin, Côte d'Ivoire, Senegal and Togo. World Bank, Washington, DC. World Bank.

33 World Bank, 2019. Climate Change and Marine Fisheries in Africa. https://doi.org/10.1596/33315.

34 Harnessing Agricultural Potential for Growth and Development in West Africa, 2012. United States Economic Commission for Africa (UNECA).

35 Lelia, C., Juan José, M., Maria S., 2019. The Cost of Coastal Zone Degradation in West Africa : Benin, Côte d'Ivoire, Senegal and Togo. World Bank, Washington, DC. World Bank.

36 Botes, F., and Buck, S., 2018. "Strengthening Africa's Gateways to Trade." PricewaterhouseCoopers.

37 World Bank, 2019. Climate Change and Marine Fisheries in Africa. https://doi.org/10.1596/33315.

38 ibid.

39 Ahmadou Aly, M., 2020, "Confronting the Challenges of Climate Change on Africa's Coastal Areas." Brookings (blog).

40 World Bank, 2019. Climate Change and Marine Fisheries in Africa. https://doi.org/10.1596/33315.

41 M. Demé, Djiga Thiao, F.N. Sow, Abdoulaye Sarre, 2012. Dynamique des Populations de Sardinelles en Afrique du Nord-Ouest: Contraintes Environnementales, Biologiques et Socio Economiques. USAID/COMFISH, Rhode Island.

42 Beatley, M., and Edwards, S., 2018, "Overfished: In Senegal, Empty Nets Lead to Hunger and Violence." Medium.

"Climate change is accelerating transnational migration and displacement. It is also accelerating the spread of organized violence in the West African Sahel."

generate a range of social challenges. As sea-level rise accelerates, conflict of the kind seen in Senegal's fishing villages will intensify and provoke further conflict. For example, as access to fish and arable land decreases, young men in Agbavi, Togo have joined criminal syndicates involved in fuel smuggling and beach-sand mining, an illegal enterprise that worsens erosion.[43] An examination of the Sahel region and the Lake Chad Basin offers a troubling preview of the impending outbursts of conflict linked to food insecurity and climate change.

Transhumance dynamics

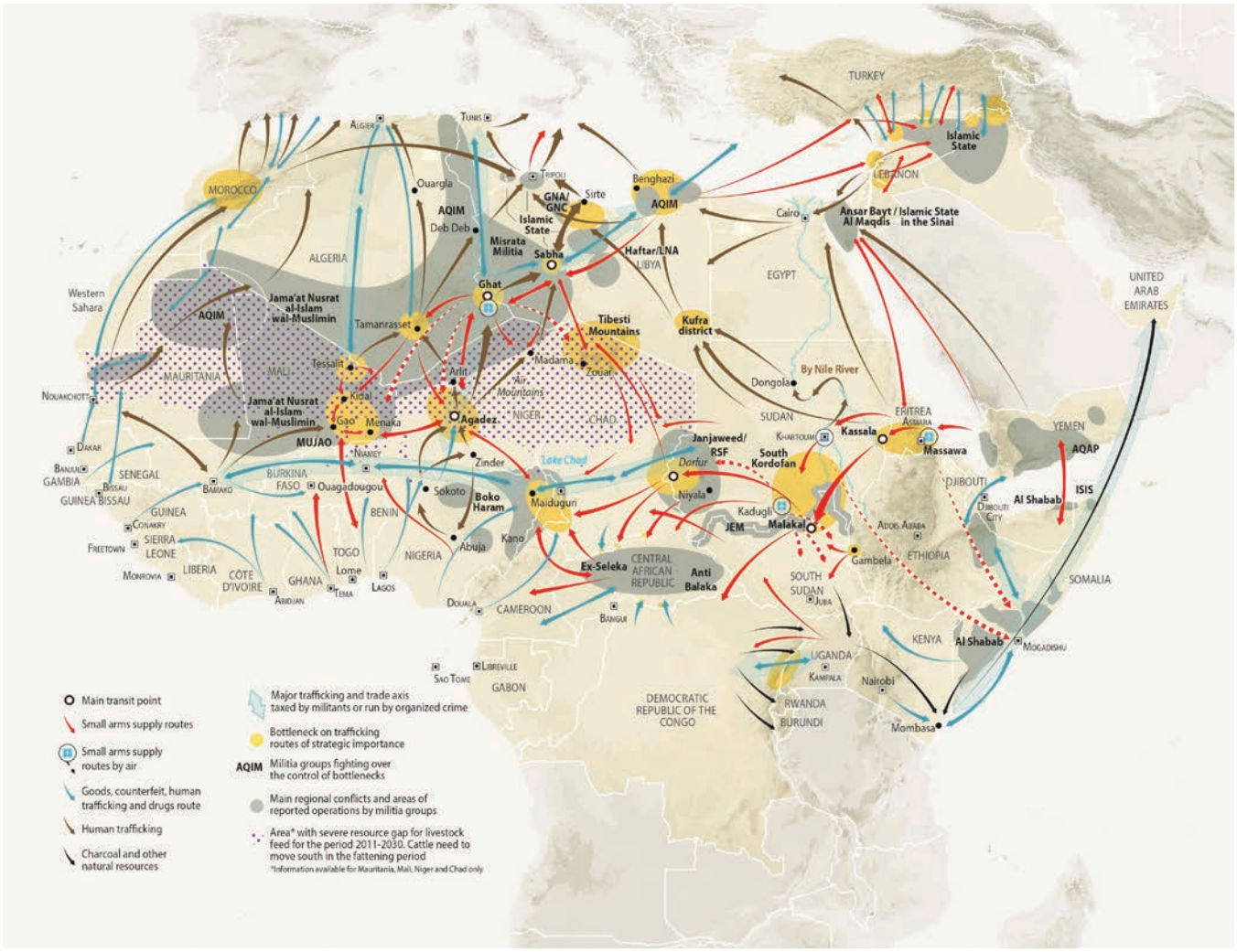
Climate change is accelerating transnational migration and displacement. It is also accelerating the spread of organized violence in the West African Sahel, although it must be noted that the relationship between migration and organized violence is complex, non-linear and irreducible to mere linear causation. The region is widely considered one of the world's most vulnerable to extreme heat, with temperature increases projected to be 1.5 times higher than in the rest of the world.[44] Climate vulnerability is compounded by the region's high dependence on rainfed agriculture and natural resources to support food security and livelihoods, weak governance, rapid population growth, and chronic humanitarian crises due to recurrent drought, flooding, crop failures, epidemics and violent conflict.[45]

43 Matteo Fagotto, 2016. West Africa is Being Swallowed by the Sea. Foreign Policy.

44 Muggah, Robert and Juan Cabera, 2019. The Sahel is Engulfed by Violence, Agenda, 23 January, https://www.weforum.org/agenda/2019/01/all-the-warning-signs-are-showing-in-the-sahel-we-must-act-now/

45 Center for International Earth Science Information Network, 2014. Mapping the Exposure of Socioeconomic and Natural Systems of West Africa to Coastal Climate Stressors. US AID.

Figure 5. Trans-Sahara Trafficking and Threat Finance. October 2017.



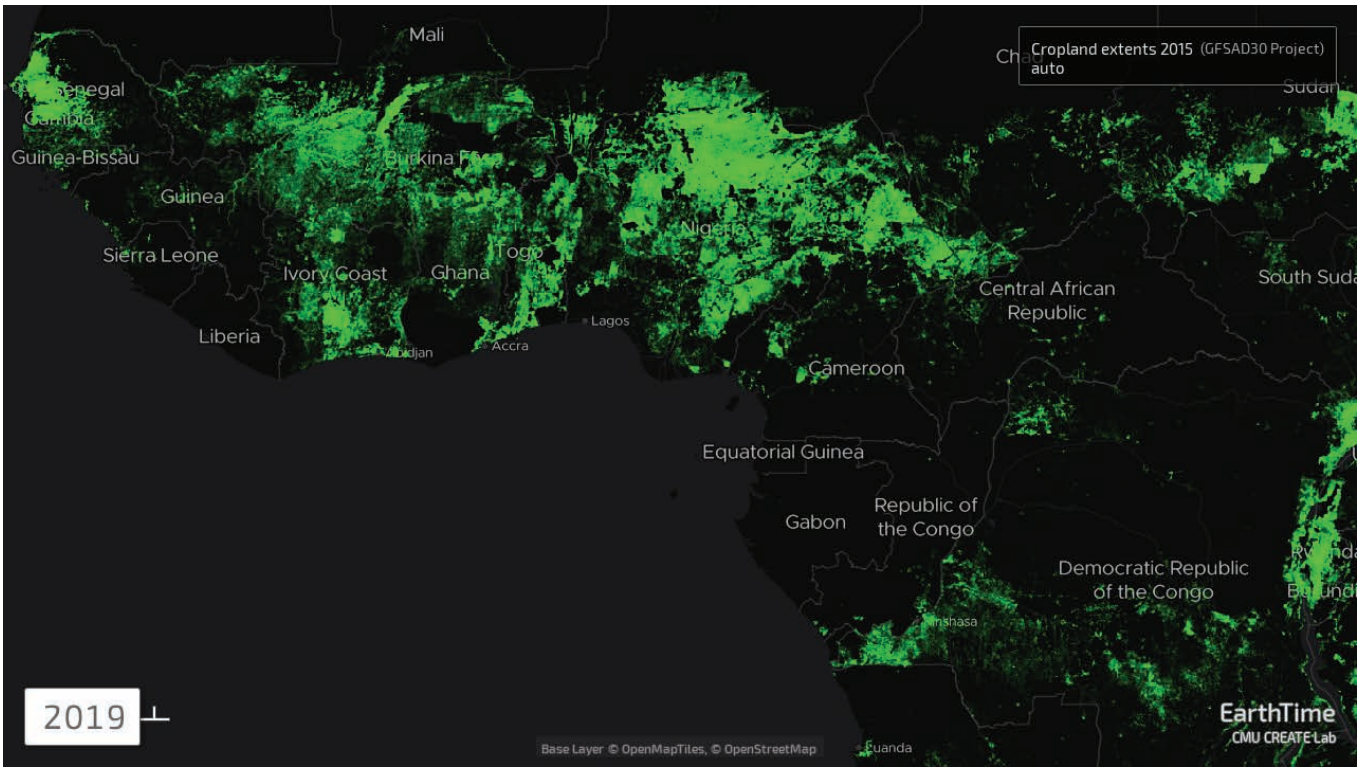
Source: RHIPTO - Norwegian Center for Global Analyses, 2016

Short-term shocks (e.g. extreme weather events) and longer-term stresses (e.g. reduced groundwater) are deepening systematic risks across many West Africa countries. With substantial population growth (populations in the region are doubling every twenty years) and recurring challenges linked to environmental degradation, pervasive poverty and political instability already problematic, climate change will compound existing risks.[46] Prolonged water scarcity, longer dry seasons and sustained higher temperatures could exacerbate low-level conflict and trigger forced migration, issues that already impact the region. In this respect, climate contributes to a "vicious cycle," whereby climate impacts exacerbate existing conflicts and displaced populations, which in turn increase the vulnerability of those populations to further climate impacts.[47]

46 Doucet, L, 2019. The Battle on the Frontline of Climate Change in Mali. BBC News.

47 Day, A., and Caus, J., 2019. Conflict Prevention in an Era of Climate Change. United Nations University Center for Policy Research.

Figure 6. Cropland extent[48]



Flashpoints include deepening disputes between occupational groups, such as farmers and pastoral communities. Approximately 20 million Sahelian pastoralists travel with their livestock during the dry season, moving southward to coastal countries to follow moisture, then back northward during the wet season.[49] Pastoralists are central to the region's economy. For example, pastoral systems sustain roughly 40% of Chad's rural population, about 3.5 million people.[50] The forecasted intensification of drought risks and shortening of rainy seasons, as well as the increased interannual variability of rainfall, imposes stress on livelihoods that are already highly dependent on rapidly diminishing water access.[51]

Furthermore, these changes disproportionately harm women pastoralists, whose reproductive responsibilities mean they have less time to find new breeds of livestock which may be better suited to the region's changing climatic and ecological conditions.[52]

48 Retrieved from earthtime.org; filter "Cropland Extent" 2015

49 Plante, C., Berger, C., Ba, A., 2020. Pastoralists on the move in the Sahel: the original climate-adaptaters. World Bank Blogs.

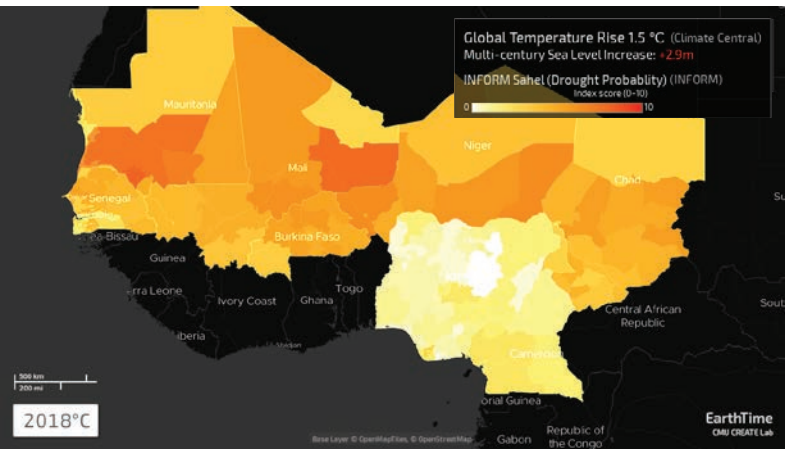
50 Krätli, S., 2017. "Systémes pastoraux dans le Dar Sila, Tchad. Feinstein International Centre, Tufts University.

51 Burkina Faso, n.d. , Climate Change Adaptation. United Nations Development Program.

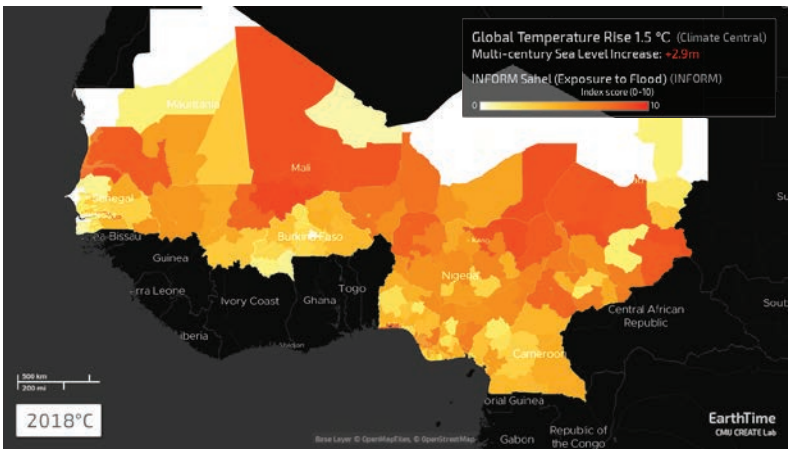
52 Organization for Economic Cooperation and Development, 2020. Women and Climate Change in the Sahel. West African Papers.

Figure 7. West Africa Climate Risks at 1.5° C of Warming[53]

Drought



Flood



Push factors such as reduced water access and violent disputes - including those involving military, paramilitary and police actors - can push pastoralists into new territories. This in turn can result in (violent) competition and tension with farmers, especially if customary dispute resolution systems are eroded or broken down. Political and economic elites may also exacerbate tensions, especially when businesses interests are involved.[54] Disputes may escalate into conflict due to competition for water and to pastoralists over-using farmers' fields or crops. This is increasingly likely because pastoralists are forced by aridification into areas that were previously exclusively agricultural, and because climate change has been shown to accelerate land degradation and reduce livestock health, thus exacerbating the socioeconomic factors driving conflict between these groups.[55]

Additionally, the increased variability of the dry and wet seasons causes pastoralists to arrive at different locations at different times, meaning that longstanding seasonal resource-sharing relationships no longer function.[56] Violent clashes are more likely in areas already destabilized by violence and with more limited state presence, including central and northern Mali and in central and northern Nigeria.[57] West Africa has seen 3,323 violent events and 9,842 fatalities in 2020 alone.[58]

53 Retrieved from earthtime.org; filters "INFORM Sahel (Drought Probability) 2018; "INFORM Sahel (Exposure to Flood) 2018

54 Luiza, M., 2019. Urban Elites' Livestock Exacerbate Herder-Farmer Tensions in Africa's Sudano-Sahel, New Security Beat, 23 June, https://www.newsecuritybeat.org/2019/06/urban-elites-livestock-exacerbate-herder-farmer-tensions-africas-sudano-sahel/

55 Abroulaye, S., Savadogo, I., Abalo, K, and Nouhoun, Z. (2015) 'Climate Change: A Driver of Crop Farmers - Agro Pastoralists Conflicts in Burkina Faso' in International Journal of Applied Science and Technology, Vol. 5, No. 3, June 2015

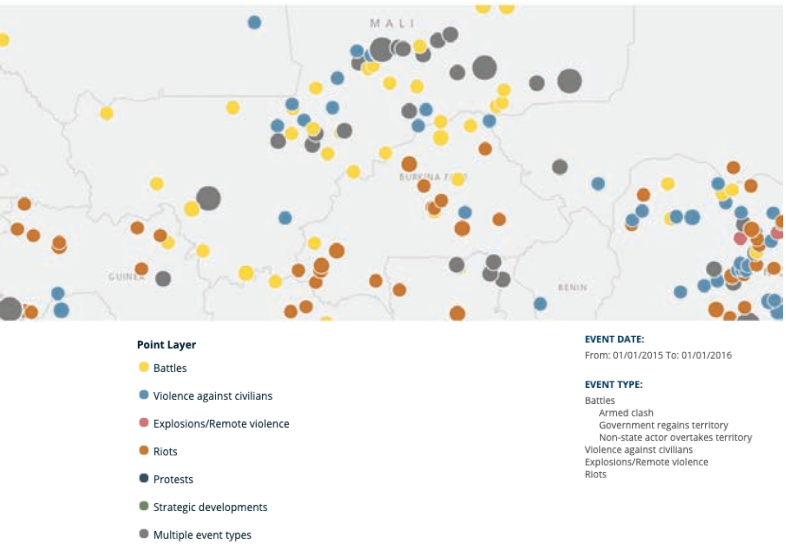
56 United Nations Office for West Africa and the Sahel (UNOWAS), 2018, "Pastoralism and Security in West Africa and the Sahel."

57 ibid.

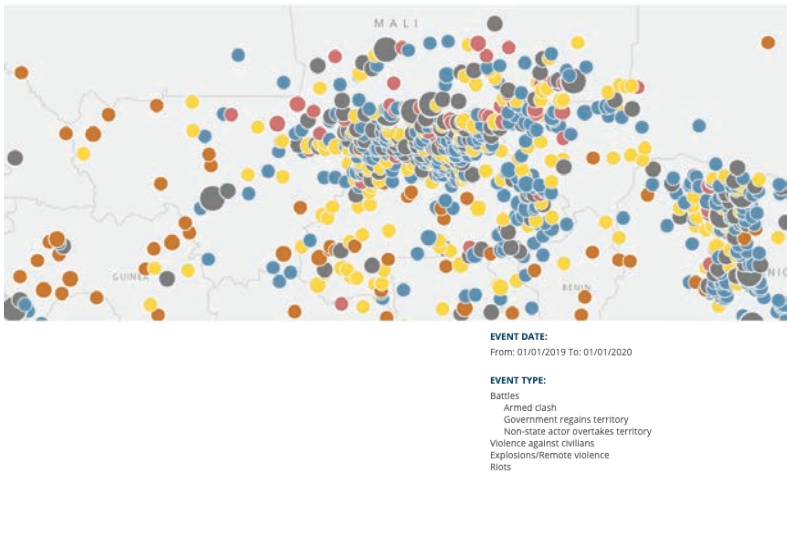
58 ACLED Dashboard. Available at: https://acleddata.com/dashboard/#/dashboard Query: 1/1/20-7/31/20; Battles, Violence against Civilians, Explosions / Remote Violence, Riots, West Africa.

Figure 8. Maps of Mali-Burkina Faso conflicts[59]

2015



2019



Since Mali's 2012 Tuareg secessionist rebellion, pastoralists have been forced southward from the Gao region into the Mopti and Inner Niger Delta regions, and into nearby regions of Burkina Faso and Niger. Attacks by insurgent groups, target state officials and religious opponents typically occur along ethnic lines. Mali registered 3,850 deaths from armed conflict in the first seven months of 2020, compared to only 316 in 2016 (see Figure 8).[60] The rise of violent extremist groups has inspired similar violent activism in nearby countries. Year 2016 saw the rise of violent extremist group Ansarul Islam in the Soum province of northern Burkina Faso. The group has close links to Katibat Macina, a similar armed actor from Central Mali.[61] The rise of armed extremist groups has been linked to increased suppression of civil women's groups, reinforcing already-dramatic gender disparities in the region.[62]

In the middle-belt region of Nigeria, farmer-pastoralist clashes are claiming more lives than in the rest of Western Africa combined.[63] The southward "migratory drift" of pastoralism has accelerated, contributing to greater conflict in southern regions of the country. This drift is due in part to unreliable access to water and to endemic violence caused by so-called bandit groups in Zamfara State, on the border with Niger—an example of multiple risk factors including climate change, pre-existing conflict and lack of state structures interlinking and reinforcing each other. In addition, several thousand Fulani pastoralists were killed by Boko Haram in the Lake Chad region, and tens of thousands have been displaced, many losing their livestock and ending up destitute. The UN High Commissioner for Refugees (UNHCR) estimates that over 62,000 people were displaced by pastoralist-farmer clashes in Nigeria in 2017.[64]

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59 Retrieved from ACLED Dashboard. Filters: 1/1/15-12/31/15, "Battles" "Violence against Civilians" "Explosions/Remote Violence" "Riots; 1/1/19-12/31/19, "Battles" "Violence against Civilians" "Explosions/Remote Violence" "Riots. Available at: https://acleddata.com/dashboard/#/dashboard

60 ACLED Dashboard, Mali 2016

61 United Nations Office for West Africa and the Sahel (UNOWAS), 2018, "Pastoralism and Security in West Africa and the Sahel."

62 Eizenga, 2018; cited in "Women and Climate Change in the Sahel." West African Papers. Organization for Economic Cooperation and Development, March 2020.

63 United Nations Office for West Africa and the Sahel (UNOWAS), 2018, "Pastoralism and Security in West Africa and the Sahel."

64 ibid.

Impacts of Water Fluctuation in the Lake Chad Basin

Lake Chad and its surrounding Basin (LCB) have long been a case study in the intersection of climate change and security. The Lake provides food and water to approximately 50 million people.[65] Of these, 2.5 million are displaced, 6.9 million are severely food insecure and 10.7 million are in need of humanitarian assistance.[66,67] Today, it is the site of the second largest displacement crisis on the planet. The LCB spans Cameroon, Chad, Niger and Nigeria, countries faced with comparatively high rates of corruption, high levels of poverty, low indices of higher education and weak national integration.[68,69] The region, which is home to nearly 70 ethnic groups, became particularly volatile with the rise of Boko Haram in 2009.[70] A number of national military, armed opposition, extremist and vigilante groups all operate in the region.[71]

Because Lake Chad is only a few meters deep, it is particularly sensitive to a changing climate. Following a peak in the late 1960's, the Lake's surface area receded during a devastating drought in the 1970's and 1980's. Since then, its surface area appears to have increased as greater precipitation has swelled its input rivers over the past thirty years. However, the relationship between climate change and the lake's surface continues to be debated. For one thing, the lake's relatively shallow average level of one meter means that small changes to inflow can effect misleading changes in surface area.[72] It is even unclear what constitutes "surface area," as water hidden beneath vegetation is often excluded from satellite analyses.[73] The effects of climate change on rainfall over the Chari-Logone Basin (the main source of the Lake's water) remain unclear, but models suggest that interannual variation will increase—meaning there could be more overall precipitation in the form of extreme rainfall and flooding.[74]

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65 Pham-Duc, B., et al., 2020. The Lake Chad Hydrology under current climate change. Nature Research: Scientific Reports 10.

66 Nagarajan, C., et al., 2018. "Climate Fragility Profile: Lake Chad Basin." Adelphi, Berlin.

67 Report of the Secretary-General on the situation in the Lake Chad Basin region, 2017. United Nations Security Council.

68 Traszkai, A., 2018. Water conflicts. Case Study - Lake Chad conflict. Strategic Impact 3.

69 *"National integration" refers to the degree of connectedness between a countries' urban centers and its rural periphery.* Chitra Nagarajan, Benjamin Pohl, Lukas Rüttinger, Florence Sylvestre, Janani Vivekananda, Martin Wall, Susanne Wolfmeier, 2018. Climate Fragility Profile: Lake Chad Basin. Adelphi, Berlin.

70 Nagarajan, C., et al., 2018. "Climate Fragility Profile: Lake Chad Basin." Adelphi, Berlin.

71 Okpara, U., et al., 2015. Climate Fragility Profile: Lake Chad Basin. Adelphi, Berlin.

72 Nagarajan, C., et al., 2018. "Climate Fragility Profile: Lake Chad Basin." Adelphi, Berlin.

73 ibid.

74 ibid.

Climate change threatens to disrupt the enlargement and contraction cycle of the LCB. Climate models suggest that rising temperatures will make the Sahel region wetter, although more research is needed.[75] Meanwhile, climate change will very likely exacerbate interannual variability - meaning changes to the duration of the rainy season, more extreme rainfall and drier dry periods. The possible benefits of increased rainfall may therefore be offset by the risk of catastrophic floods, among other conditions, that make it difficult to harvest water.[76] As regular, reliable access to water decreases, so too will access to arable land: the Sahel is moving south by 1,400 square miles a year.[77] The LCB's population, which is growing at an annual rate of nearly 3%—the global growth rate is just 1.1% a year—will be forced to survive on an ever thinner margin.[78]

As regular, reliable access to water decreases, so too will access to arable land: the Sahel is moving south by 1,400 square miles a year.

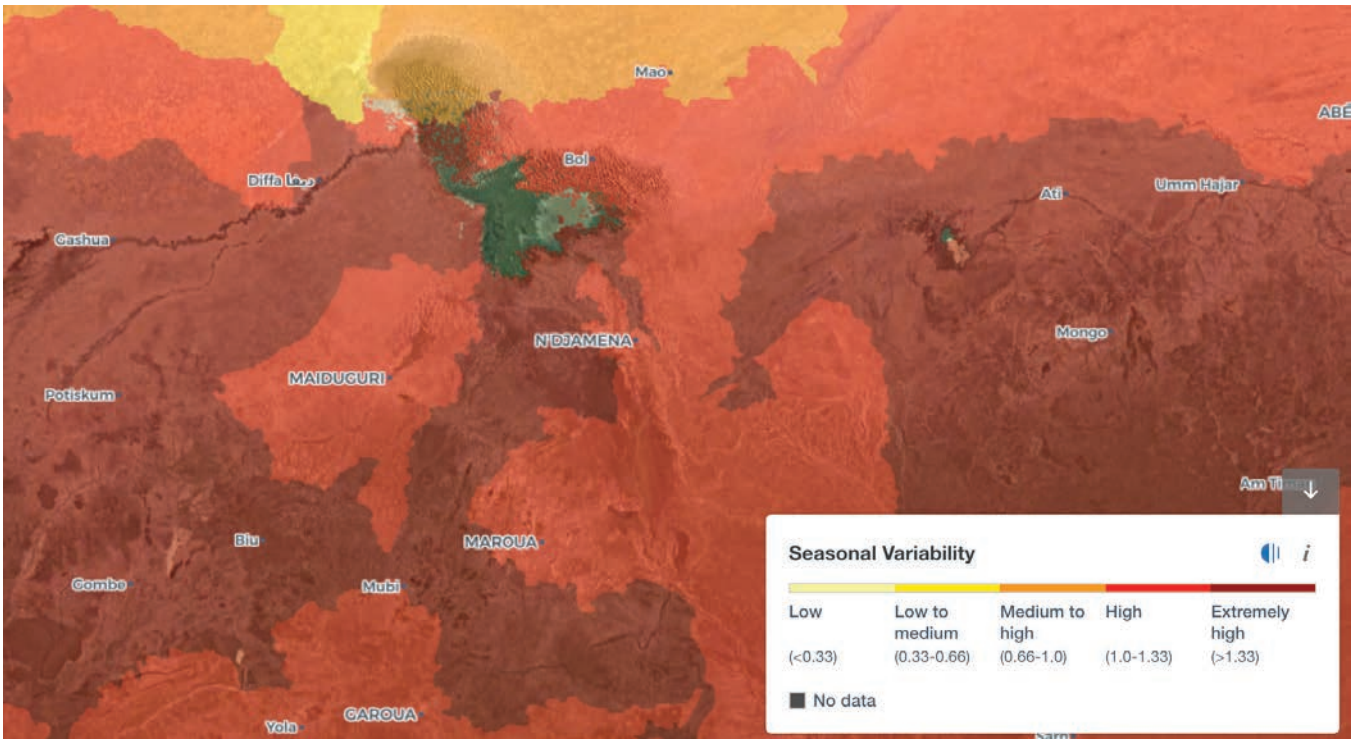
75 Roehrig, R., et al., 2013. "The Present and Future of the West AFrican Monsoon: A Process-Oriented Assessment of CMIP5 Simulations along the AMMA Transect." Journal of Climate 26, no. 17.

76 ibid.

77 Sayne, A., 2011. Climate Change Adaptation and Conflict in Nigeria (No. 274). United States Institute of Peace, Washington D.C.

78 Okpara, U., et al., 2015. Conflicts about water in Lake Chad: Are environmental vulnerability and security issues linked? Progress in Development Studies 15, 308-325

Figure 9. Projected Seasonal Rainfall Variability in LCB by 2040 under "Business as Usual" Conditions[79]



Dramatic changes to weather patterns will almost certainly disrupt an already precarious economy. Indeed, there are already devastating effects of heightened interannual variability: hundreds of thousands of farmers missed four consecutive planting seasons by 2017.[80] This can tip families that are already living at the margins into total destitution. In the Niger's Diffa region in the west of the LCB, for example, more than half the population lacks access to basic health-care services or potable water, thus increasing the likelihood of the transmission of infectious diseases.[81] Crop failures there can result in extreme poverty and higher levels of mortality and morbidity.

Rising food insecurity, combined with reduced access to basic resources, deepening economic marginalization and poor health can increase desperation, fuel grievances and, if mobilized by elites, increase the likelihood of outright violence. Such resource scarcity can produce crises that cross borders and provoke further conflict. Past experience supports this: between 1980 and 1994, for example, nearly 60,000 Nigerians followed the receding lake waters into Cameroonian territory in search of fishing, cultivation and livestock rearing.[82] At the height of the drought, 3,000 Chadian soldiers attacked and occupied nineteen islands and six villages in Nigerian territory. As a consequence of the war, the border between Chad and Nigeria was closed until 1986.[83]

79 Retrieved from WRI Aqueduct Project. Filters: "Future"; "Business as Usual"; "Absolute Value"; "Seasonal Variability." Available at: wri.org/applications/aqueduct/water-risk-atlas

80 Report of the Secretary-General on the situation in the Lake Chad Basin region, 2017. United Nations Security Council.

81 Report of the Secretary-General on the situation in the Lake Chad Basin region, 2017. United Nations Security Council.

82 Okpara, U., et al., 2015. Conflicts about water in Lake Chad: Are environmental vulnerability and security issues linked? Progress in Development Studies 15, 308-325.

83 Treszkai, A., 2018. Water conflicts. Case Study - Lake Chad conflict. Strategic Impact 3.

When parts of Lake Chad recede or flood, groups relying on different livelihoods (e.g. agricultural and pastoralism) and living in conditions of precarious scarcity can come into increased contact and competition. Recent examples include recurrent clashes between Shuwa Arabs from the Chadian east and the Fulani pastoralists from the Nigerian southwest over limited fishing and pastoral opportunities at the Lake's southern pool.[84] The LCB's current population density is 50 individuals per km2 (the US's is 36 per km2).[85] As populations are compressed in the absence of opportunities and structures to mediate tensions, the potential for violent escalation is rising.

A major factor exacerbating violence escalatory dynamics in the LCB is state-led military interventions, many of which have in turn increased vulnerability to climate shocks by shutting down traditional coping mechanisms.[86] Indeed, Boko Haram spread to Cameroon in 2014 and Niger and Chad in 2015, and post-9/11 U.S. and European-funded initiatives have further militarized the region.[87,88] Violent fatalities have climbed from less than 100 in 1997 to around 11,000 in 2014.[89] Currently, the principle counter-insurgency operations are focused on two Jihadi militant groups sustaining insurgencies in Burkina Faso, Mali and Niger - the al Qaeda-affiliated Jama'at Nusrat al-Islam wal-Muslimin (JNIM) and the Islamic State in the Greater Sahara (ISGS). There are also an assortment of government forces and community militia that are implicated in such operations. Abuses by government military and proxies are routine.[90]

84 Okpara, U., et al., 2015. Conflicts about water in Lake Chad: Are environmental vulnerability and security issues linked? Progress in Development Studies 15, 308-325.

85 ibid.

86 "Insurgency, Terrorism and Organized Crime in a Warming Climate." adelphi; Climate Diplomacy, October 2016.

87 Nagarajan, C., et al., 2018. "Climate Fragility Profile: Lake Chad Basin." Adelphi, Berlin.

88 Fah, G., 2007. The War on Terror, the Chad-Cameroon Pipeline, and the New Identity of the Lake Chad Basin. Journal of Contemporary African Studies 25, 101–117.

89 Okpara, U., et al., 2015. Conflicts about water in Lake Chad: Are environmental vulnerability and security issues linked? Progress in Development Studies 15, 308-325.

90 Carayol, R., 2020. Au Sahel, les massacres s'amplifient malgré le Covid-19.Orient XX1, https://orientxxi.info/magazine/au-sahel-les-massacres-s-amplifient-malgre-le-covid-19,3830.

Select Responses in West Africa

The links between climate change and insecurity in West Africa are growing clearer. What is more, a variety of national, bilateral and multilateral entities are already implementing subnational and regional responses to these threats. Consider, for example, the "great green wall," an $8 billion plan to reforest 247 million acres of degraded land in a broad, 4,815-mile swathe along the Sahel's southern edge from Dakar to Djibouti. Launched in 2007 by the African Union, the project, which is also funded by the United Nations, the World Bank and the European Union, is expected to reach completion in 2030. The restored land is predicted to absorb nearly 250 million metric tons of CO2 from the atmosphere.[91] Coastal countries such as Nigeria and Senegal have seen relative success, afforesting five million and twenty-five thousand hectares of land, respectively. However, terrorism and corruption have hampered the project in landlocked Central African countries like Burkina Faso.[92]

Meanwhile, the Nigerian government has sought to quell farmer-pastoralist conflict using military force, often through military operations such as Exercise Cat Race and Operation Whirl Stroke. These have had mixed results. Some areas have seen reduced conflict, but many villages remain empty, with security officers unable to guarantee displaced communities a safe return. Additionally, the Nigerian government introduced a plan to establish "cattle colonies": 5,000 hectare clusters of ranches with grass, water and veterinary services as well as schools, hospitals and marketplaces.[93] The proposal was accepted in the sparsely populated north-eastern and north-western states but criticized in Nigeria's Middle Belt for its echoes of colonial land policy, issues of land scarcity and concerns of inequity. Nevertheless, the project is moving forward in conflict-plagued states such as Zamfara, as well as nine other states, where the government has committed to spending approximately $473 million over the first ten years.[94]

Mounting environmental and security issues have prompted calls for "environmental peacebuilding," a theoretical two-birds-with-one-stone approach wherein warring parties find common ground tackling shared environmental threats. The exact mechanics of this strategy are still in development, but these proposals signal a growing desire for policy responses that consider climate change and conflict in tandem.[95] A project led by CGIAR, Vodafone and Ghana's Council for Scientific and Industrial Research, among other partners, has sought to make Ghanaian farmers better prepared for climate risks through a public-private climate information services initiative. By the end of 2019, the project had succeeded in providing real-time climate information to 300,000 farmers, 21% of whom were women.[96] Further challenges include ensuring that such climate-related peacebuilding efforts do not inadvertently undermine climate resilience and ensuring

91 Baker, A., and Toubab, M. "Can a 4,815-Mile Wall of Trees Help Curb Climate Change in Africa?" Time. Accessed August 31, 2020.

92 Silja, F., 2020. "What Happened to Africa's Ambitious Green Belt Project?" DW.COM.

93 Crisis Group, 2018, "Stopping Nigeria's Spiralling Farmer-Herder Violence." https://www.crisisgroup. org/africa/west-africa/nigeria/262-stopping-nigerias-spiralling-farmer-herder-violence.

94 ibid.

95 Beever, E., 2020. "Caught in Climate Security Inaction." War on the Rocks.

96 CGIAR Research Program on Climate Change, Agriculture and Food Security. "Upscaling Climate Information Services and Technologies through IT-Led Public-Private Partnership Business Models," April 29, 2019. https://ccafs.cgiar.org/upscaling-climate-information-services-and-technologies-through-it-led-public-private-partnership.

that climate change adaptation projects are carried out with attention to existing or potential conflicts.[97]

Additionally, research shows that gendered experiences of social exclusion may produce situations in which women are more likely to cooperate, rather than compete, when presented with conditions of scarcity.[98] These findings—and the rigorous body of literature on the disproportionate harms that climate change and violence enact upon women—demonstrate the urgency for, and the promise of, climate and conflict responses that incorporate gender disparities and the needs of women.

It is not necessarily the case that climate change will precipitate conflicts between and within states, though it certainly increases the risk. Future dispute resolutions may look to the 1964 Lake Chad Basin Commission which delegates conflicts between Mali, Niger, Nigeria and Chad to international bodies such as the International Court of Justice. It also set the foundations for climate-specific response policies: recently, the LCBC initiated the "Transaqua" project to transfer waters from the Congo basin to Lake Chad, as well as a united 2014 military response to the emergence of Boko Haram in the Lake Chad region.[99] Such transnational coalitions will be critical for addressing impending crises at the intersection of climate change and conflict.

...it is absolutely necessary that governments respond to climate change and violence with more precise attention to the complex interlinkages between the two.

Ultimately, it is absolutely necessary that governments respond to climate change and violence with more precise attention to the complex interlinkages between the two. This means adopting multi-scalar analyses of climate and violence that incorporate local, national and regional changes. It means incorporating climate warning systems at the ground level to increase local community resilience. It means strengthening institutions and ensuring that emergency responses to climate change and conflict do not unintentionally exacerbate one or the other. Only by recognizing and systematizing the complex links between climate and conflict can communities, governments and humanitarian bodies properly enact changes that produce peace and prosperity in a warming world.

97 Brown, O., 2020. "North Africa & Sahel." Climate-Fragility Risk Brief. Climate Security Expert Network.

98 Patt et. al., 2019; "Women and Climate Change in the Sahel." West African Papers. Organization for Economic Cooperation and Development, March 2020.

99 ECC Library. "Transnational Conflict and Cooperation in the Lake Chad Basin | ECC Factbook." Data Platform, March 11, 2015. https://library.ecc-platform.org/conflicts/lake-chad-africa-inter-state-conflicts-and-cooperation.

Table 1. Relevant Datasets

Name	Description	Accessibility
Armed Conflict and Location Even Data Project (ACLED)	Georeferenced database detailing a variety of conflict events in real time.	Publicly Available Downloads
WRI Aqueduct	Georeferenced database and map renderings detailing water risks and food insecurity.	Publicly Available Downloads
Uppsala Conflict Data Program (UCDP)	Georeferenced database and map renderings detailing conflict events of various types of violence by country over time.	Publicly Available Downloads by Country / Region
Famine Early Warning System Network (FEWS NET)	GIS shapefiles and images detailing food security, as well as remote sensing imagery of climate hazards and forecasts.	Publicly available Downloads
Global Database of Events, Language and Tone	Georeferenced database of a variety of events pulled real-time from broadcast, print and web media.	Publicly Available Downloads by Query
New West Africa Coastal Zone Data Collection at SEDAC	Socioeconomic database detailing climate vulnerabilities and climate stresses in the West Africa coastal zone.	Publicly Available Downloads
The Regional INFORM Sahel Model	Database detailing factors such as vulnerability, risk drought probability, exposure to flood, food security, food insecurity, child mortality.	Publicly Available Downloads

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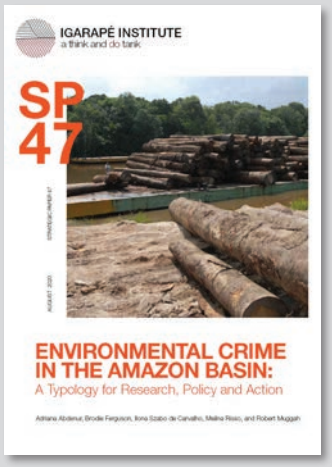
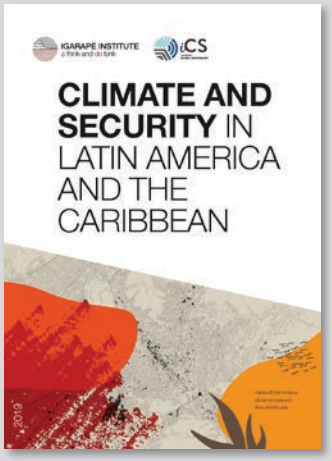


STRATEGIC PAPER 47

ENVIRONMENTAL CRIME IN THE AMAZON BASIN: A Typology for Research, Policy and Action

Adriana Abdenur, Brodie Ferguson, Ilona Szabo de Carvalho, Melina Risso, and Robert Muggah

(July 2020)



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Adriana Erthal Abdenur, Giovanna Kuele and Alice Amorim

(December 2019)

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