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Unsustainable Futures

Cycles of Environmental Violence

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In the aftermath of civil war, when countries' environmental institutions are weakest, bad actors take advantage of the conflict-free environment to open illicit industries in protected forests. The resulting deforestation disrupts socioeconomic systems, amplifies poverty, and displaces communities, which increases the likelihood of renewed conflict or civil war. To combat cycles of mutually reinforcing environmental destruction and armed conflict, U.S. foreign assistance during post-conflict reconstruction can focus greater attention on strengthening environmental institutions.

Introduction

After peace negotiations ended the Second Congo War in 2003, the Democratic Republic of Congo (DRC) experienced a rapid rise in illegal deforestation in protected forests.[1] Almost two decades later, the negative environmental consequences of unchecked deforestation have increased land disputes and resource competition in the DRC, ushering in a new era of violence and conflict.[2]

Conflict often resurfaces when peacemakers in the immediate post-conflict period fail to provide environmental institutions with the resources needed to combat illegal deforestation. Widespread forest loss worsens drought and desertification, the availability of arable land, and mass migration.[3] These stressors lead to new violence and crime, creating a long-term cycle of deforestation and conflict.[4] The United States can break these cycles by consistently involving environmental experts in the peacemaking process and expanding the scope of peace and security foreign assistance to include environmental security.

Deforestation Generates Conflict

Forests cover over 31 percent of the planet's surface, providing jobs, stabilizing ecosystems, and capturing carbon dioxide from the atmosphere. Deforestation creates or contributes to: (1) desertification and drought, reducing available water and cultivable land; (2) the displacement of animals, which can become vectors for disease; and (3) greenhouse gas release into the atmosphere.[5] Rapid deforestation thus disrupts economies, endangers public health, and accelerates climate change.[6] These conditions amplify competition for scarce resources, increasing the likelihood of armed conflict.

- **Land Degradation, Desertification, and Drought.** Drought and desertification lead to resource scarcity, creating competition for arable land, water, and other commodities. Over time, this tension can result in rising violence and crime that may escalate to civil

war.[7] In Myanmar, violence against the Rohingya ethnic group is linked to resource scarcity and environmental stress fueled by deforestation. A decline in mangrove tree cover in the Rakhine state resulted in a value loss of $946.87 million per year due to environmental degradation and resource loss. The government responded by clearing the Rohingya from their land, citing the need to execute a new development plan.[8]

- **Mass Migration.** Deforestation can create environments that are inhospitable or that produce extreme hardship, resulting in increased internal migration and asylum-seeking.[9] When deforestation creates scarcity and disrupts local economies, migrants flee their communities in search of natural resources.[10] For example, the Second Sudanese Civil War in 1985 followed years of post-war environmental degradation. Persistent drought and desertification in northern Sudan induced people and herds to move south, where groups competed over increasingly scarce resources.[11] Competition between different groups over these resources contributed to the outbreak of civil war.

  Similarly, the Banyabwisha community from the state of North Kivu in the Democratic Republic of Congo (DRC) migrated to the Ituri region in 2015 in search of land and other resources. The arrival of the Banyabwisha has stoked tensions between the Hema and Lendu pastoralist groups—their fight over scarce natural resources risks a return to civil war in the DRC.[12]

- **Disease Transmission.** Deforestation is a leading driver of infectious disease transmission, which can increase chronic stress and anxiety, polarize society, and lead to social unrest.[13] Many forest-dwelling animals carry viruses that can be transferred to humans when forests are cut down.[14] In Brazil, cases of Malaria have increased proportionally with a rapid rise in deforestation and agricultural expansion.[15] Where pathogen threats are common, like in Brazil, xenophobic and ethnocentric responses can result in greater violence towards minorities.[16]

- **Climate Change.** Using 2013 numbers, the IPCC estimates that deforestation contributes to ten percent of human activity's carbon dioxide emissions—a significant cause of climate change.[17] Climate change increases the risk of violent conflict. Of the 25 nations most impacted by climate change, 14 are undergoing conflict or war.[18] In Honduras, climate change has amplified drought, food insecurity, and natural disasters. Violence associated with large-scale industrial deforestation also threatens Honduran stability.[19] Climate- and violence-induced migration from Honduras through Guatemala has resulted in several violent confrontations between refugees and Guatemalan military and police forces.[20]

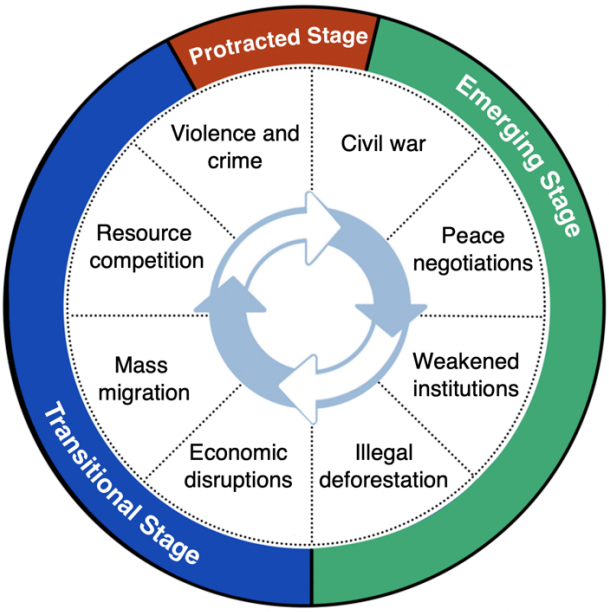
Deforestation provokes socio-economic and environmental problems that devastate communities and disrupt regional stability by decreasing access to land, water, food, and other resources. It can also destabilize the international system. For example, deforestation adds to the global flow of climate-induced forced migration. The Institute for Economics and Peace estimated that 1.2 billion people could be displaced by the climate crisis by 2050.[21] This predicted surge in climate refugees risks global security.

To prevent illegal deforestation from resulting in violent conflict and war, we must first consider why this link exists—that is, we need to understand the conflict-peace-deforestation cycle.

Modeling the Conflict-Peace-Deforestation Cycle

Peace can harm the environment in a post-civil war setting. Peace processes often result in *negative peace*, or the absence of conflict and violence. Serious challenges can arise if a state does not have the tools to achieve *positive peace*, or conditions in which humans thrive and achieve sustainable development.[22] One consequence is illegal deforestation, which is common in a country with weakened environmental institutions.[23]

Figure 1: The Conflict-Peace-Deforestation Cycle



The conflict-peace-deforestation cycle begins with the outbreak of civil war (see Figure 1). Environmental enforcement capacity deteriorates during war as oversight of and funding for environmental institutions diminishes. A peace process ends the war, but the state does not adequately consider environmental institutions as it rebuilds. Illegal mining, logging, and agriculture result in rapid deforestation that contributes to increased conflict or the resumption of civil war.

Three major stages of the conflict-peace-deforestation cycle may occur in weak states that have experienced civil war, established peace, and failed to strengthen environmental institutions during the peace process and post-war reconstruction:

- **Emerging stage.** When peacemaking ends a conflict period, but the state fails to rebuild environmental institutions, illegal deforestation will become rampant.

- **Transitional stage.** Illegal post-war deforestation has degraded forests and placed enormous environmental stress on communities. Deforestation disrupts local economies, leading to resource scarcity. Mass migration to find arable land and other natural resources begins.

- **Protracted stage.** Annual deforestation rates have been high for many years due to poor environmental management. Poverty, famine, drought, or other environmental stressors contribute to rising violence and crime in the country. This environmentally induced violence can reignite the civil war. Moreover, conflict can break out between the residents of host communities and migrants as they begin to compete for natural resources or employment. When deforestation contributes to renewed civil war, the cycle continues.

This destructive pattern raises the question of whether it is possible for international assistance to help post-civil war states avoid sliding back into violence due to environmental degradation. The United States, for example, should take environmental protection into account when delivering foreign aid and/or assisting in post-conflict reconstruction.

Breaking the Conflict-Peace-Deforestation Cycle

The conflict-peace-deforestation cycle reveals that: (1) post-war deforestation is likely to occur in any forested state that undergoes civil war resulting in weaker institutions; (2) peace will not automatically improve environmental conditions; and (3) conflict will remain a danger as long as rapid environmental degradation remains unchecked, amplifying competition for scarce resources. Thus, an investment in environmental oversight and enforcement mechanisms is necessary to minimize rapid land cover change and its negative second-order effects.[24]

The United States can help interrupt the conflict-peace-deforestation cycle by allocating bilateral aid to building stronger protections for critical natural resources during peace processes and post-war reconstruction.[25] Presently, aid allocation for environmental assistance does not fill this gap, allowing deforestation to continue unabated in post-war settings.[26] With the following action plan, the United States could take a global lead in disrupting the conflict-peace-deforestation cycle:

- **Immediate actions.** Research on post-war deforestation, as well as the link between deforestation and conflict, must be distributed across foreign assistance institutions. Agenda-setting stakeholders should also receive the data on post-war deforestation and environmental violence to begin formulating a plan of action.

- **Short-term actions.** In the short term, relevant actors at USAID, the Department of State, and the Department of Defense can convene with environmental experts to consider how foreign assistance to promote long-term peace and security can protect environmental conditions. All of the relevant stakeholders can then produce a standard for aid allocations to two types of states: those in the midst of peace processes to end civil war and those engaged in post-war reconstruction. For instance, the United States sent Colombia $106.1

million in peace and security aid in 2020.[27] To stop the country's rising deforestation rate, environmental experts familiar with the region should be involved in aid distribution decision-making to the state to protect Colombia's chances of long-term peace.

- **Medium-term actions.** In the medium term, the president can issue a memorandum instructing foreign assistance agencies to expand the scope of *peace and security* and *democracy, human rights, and governance* earmarks to promote increased global environmental security and environmental institution capacity-building. This memo should emphasize the role that environmental security plays in achieving a stable peace in post-war countries and encourage agencies to implement the practices recommended by environmental experts when delivering assistance to states ending a civil war.[28]

- **Long-term actions.** In the long term, the United States can rebrand its aid as a climate-centric foreign aid project, which can serve two critical purposes. First, promoting a foreign aid strategy that centers on environmental sustainability will help both mitigate the human influence on global warming and help states adapt to its impacts.[29]

  Second, opinion of U.S. aid may improve, giving the United States a competitive edge against Chinese aid and BRI projects.[30] Marketing U.S. aid as assistance that considers second- and third-order impacts on internal stability may be more attractive than China's short-term growth approach. In states with weak environmental impact assessment laws, BRI projects can lead to air and water pollution, biodiversity loss, deposition of hazardous waste, and exploitation of natural resources. There is no mechanism to promote green energy and low-carbon development under BRI, which has led to increased carbon emissions in all partner countries.[31]

  To distinguish U.S. foreign assistance from China's BRI, the United States can prioritize climate change and the green economy in all foreign assistance decisions. In adopting a climate-centric foreign assistance strategy, Washington has the opportunity to both increase global resilience to climate change and improve opinion of the United States abroad.[32]

In sum, foreign assistance should acknowledge the critical role of environmental enforcement and sustainable forest management in preserving long-term peace in weak states.

Countries currently in one of the three stages of the conflict-peace-deforestation cycle are Colombia (emerging stage), the DRC (transitional stage), and South Sudan (protracted stage). All are weak states that failed to rebuild their environmental institutions after civil war ended. As a result, post-war deforestation in all three threatens the likelihood of long-term peace. However, in each case U.S. foreign assistance could be deployed to reduce the likelihood of violence by investing in the countries' ability to prevent or halt illegal deforestation.

Emerging Stage: Colombia

Colombia is in the emerging stage of the conflict-peace-deforestation cycle. Since peacemaking ended the 57-year conflict period in 2016, the country has seen a rapid rise in illegal deforestation. With natural forest covering 70 percent of Colombia's land, deforestation threatens internal stability and may lay the groundwork for a return to conflict.[33] The United States has the opportunity to better allocate its peace and security aid to Colombia by funding environmental institutions and promoting environmental regulations.

Civil War, Peace, and Post-War Deforestation

The Colombian civil war began in the mid-1960s after left-wing guerilla groups, including the Revolutionary Armed Forces of Columbia (FARC), overthrew the Colombian government.[34] In 2000, the Clinton administration delivered a $10 billion dollar aid package known as Plan Colombia to assist with the peace process, however conflict continued until October 2012.[35] Two months later, the FARC withdrew its troops and Colombia experienced a 98-percent decrease in violence.[36] In 2016, after 52 years of armed conflict, the Colombian government and the FARC reached a peace agreement.[37]

After a four-year negotiation period, the peace process incorporated only three reforms to institutions governing forest use:

- **FARC withdrawal from forest safe havens.** During the civil war, FARC troops sought safe haven in the forests, using "gunpoint conservation" defend their positions. The FARC intentionally discouraged deforestation using landmines to deter attempts to access forest resources. The FARC permitted land clearing for agriculture, but prohibited personal hunting and fishing. Violating these rules resulted in public shame, imposition of fines, or even execution.[38]

- **Distribution of land titles and road construction.** The peace agreement resulted in the distribution of land titles for the forest territory formerly controlled by FARC. Unfortunately, investors in illegal land markets violated the rules of formal land tenure to clear the forests, exploit the land's resources, and then abandon the land. The construction of roads through forest land, a well-known driver of deforestation, further facilitated land grabs and the violation of forest protection laws.[39]

- **Eradication of illicit agriculture.** The Colombian government issued an order to eradicate illicit agriculture after the civil war ended—which has proved ineffective.[40] During the war, coca cultivation generated forest loss only when conflict intensity was low. When the peace process commenced in 2012, it created the ideal environment for the expansion of coca agriculture. Coca cultivation for the production of cocaine has increased since the end of the war. [41]

These regulations were insufficient to prevent armed groups and other bad actors from capitalizing on the newly conflict-free land in Colombia.[42] Many industries have expanded into Colombian

forests, including narco-agriculture, cattle ranching, infrastructure development, and agroforestry. Inadequate government environmental protection encouraged illegal deforestation.[43] Weak enforcement has emboldened violent actors operating coca plantations, illegal mines, and the timber trade.[44] Since the end of the conflict, deforestation has increased in 31 out of 39 protected forest reserves in Colombia.[45]

Figure 2 depicts annual deforestation in Colombia using Google Earth Engine satellite imagery and Global Forest Change data. When comparing forest loss in 2010, during the Colombian conflict, to forest loss in 2020, during the peace period, there is an almost one billion square meter increase in deforestation.[46] This rapid change risks creating economic instability across the country.

Figure 2: Annual deforestation in Colombia during conflict (2010) and peace (2020)

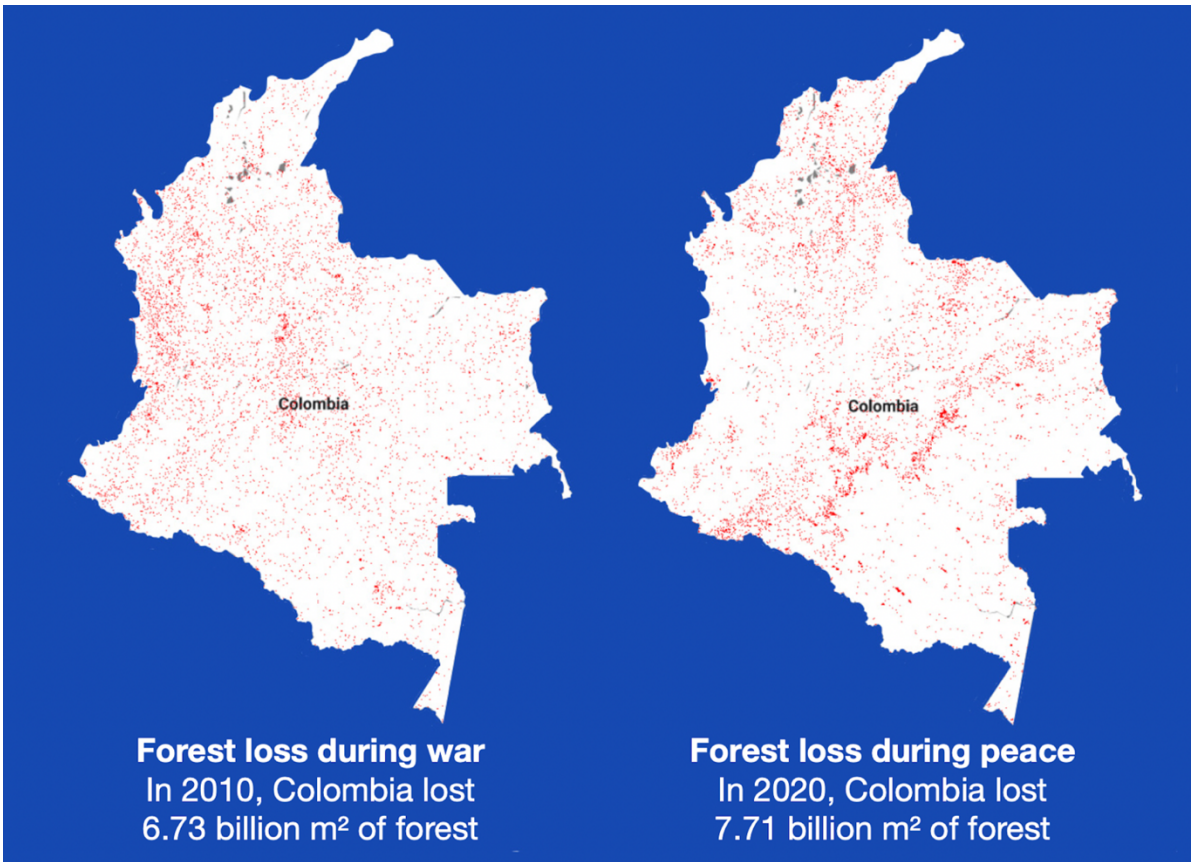
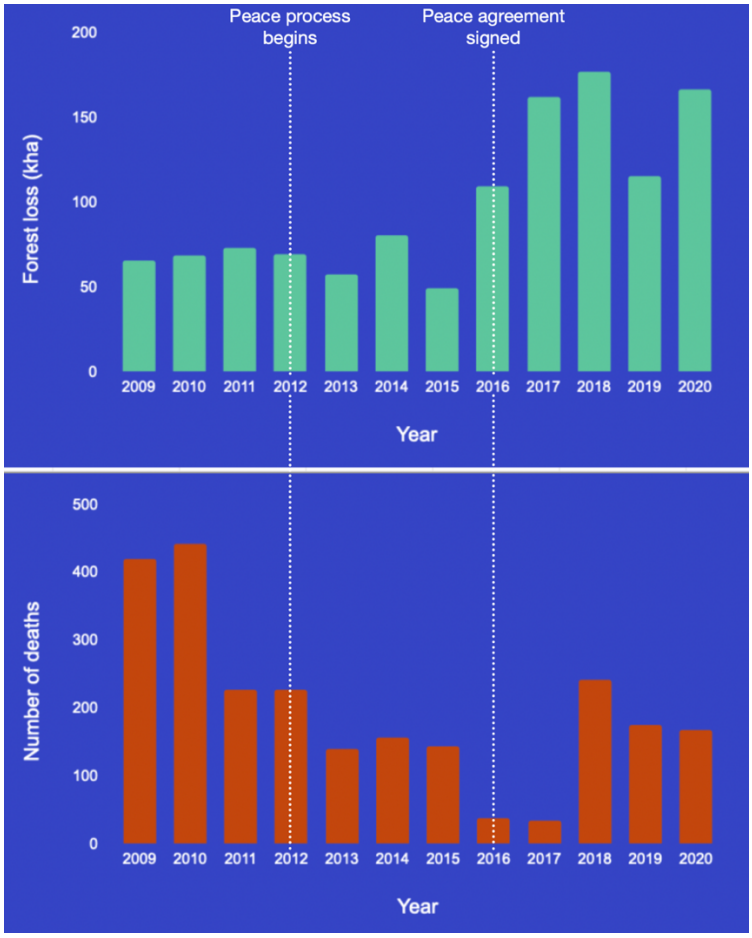


Figure 3 shows the relationship between violence and deforestation using annual forest loss data from Global Forest Watch and conflict data from the Uppsala Conflict Data Program. The end of the Colombian conflict in 2016 marked a rapid rise in deforestation, while casualties fell to levels much lower than before the peace process began in 2012.[47] Although Colombia has not yet experienced the negative effects of rapid deforestation, the state should expect increased violence and conflict in the ensuing post-war years if its environmental institutions remain weak.

Figure 3: Forest loss and casualties from armed conflict in Colombia, 2009-2020



Ending the Cycle in Colombia: An Opportunity for the United States

Rapid deforestation in Colombia will continue to create economic instability and resource competition. The state risks a return to armed conflict, despite the billions of U.S. dollars spent to promote peace.

The United States played an instrumental role in organizing and funding Colombia's peace process. In 2010, the Colombian government granted the United States authority to direct its peace talks with the FARC, with President Obama eventually pledging over $450 billion in the Peace Colombia aid package in 2016.[48] Throughout its aid efforts, however, the United States did not provide the Colombian government with sufficient environmental assistance.[49] This missed opportunity could cost the United States sustained peace in Colombia.

Since the end of the conflict, some countries have assisted in countering deforestation in Colombia. In a special pledge, the Norwegian government gave Colombia $366 million in 2019 and an additional $10 per hectare of conserved forest.[50] Post-war deforestation could potentially be reversed through these types of contributions. The United States has the opportunity now to follow

suit and adapt its strategy to environmental demands. This move will require expanding the scope of peace and security aid to include *environmental* security.

Transitional Stage: The Democratic Republic of Congo

The Democratic Republic of Congo (DRC) is in the transitional stage of the conflict-peace-deforestation cycle. High rates of annual deforestation have destabilized the DRC and resulted in an upsurge in civil conflict and violence.[51] Since the end of the Second Congo War in 2002, the mutually reinforcing relationship between conflict and deforestation has sabotaged efforts to achieve political, social, economic security.[52] The United States can play an important role in stabilizing the country by increasing spending for environmental institution-building.

Civil War, Peace, and Post-War Deforestation

Months after the end of the First Congo War, the Second Congo War broke out in August 1998.[53] Over four years, the civil war took the lives of more than four million people.[54] In 2002, the United Nations set up an Inter-Congolese Dialogue in South Africa, with strong support from member states, like the United States, to end the conflict.[55] After the successful negotiation of peace agreements, the war ended in July 2003, giving the Transitional Government of the DRC control of the government.[56] However, after a few years of peace, the Congolese National Congress for the Defense of People (CNDP) launched a rebellion against the DRC government, which lasted from 2007 until 2009, with the signing of the Goma Peace Agreement.[57]

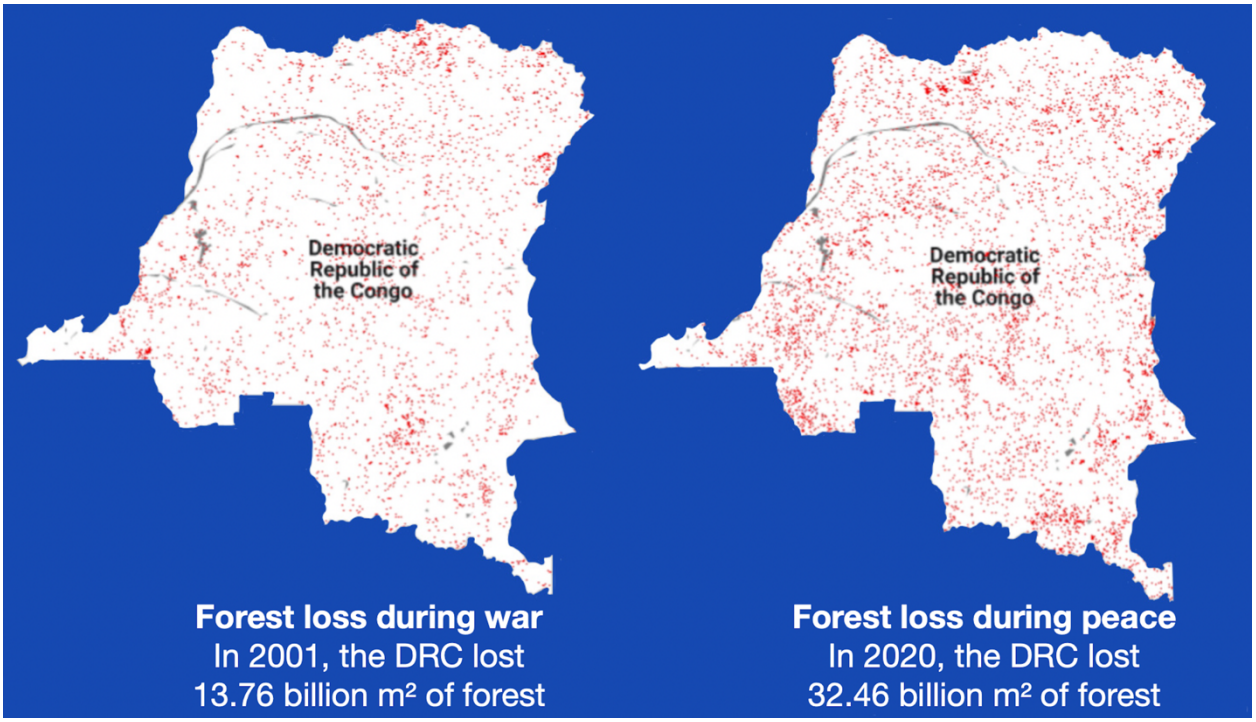
Civil war exacerbated shortages in government funding, led to a loss of intellectual capital, and worsened corruption in the DRC. Teams charged with environmental protection were left without equipment or an ability to communicate with the country's Ministry of Environment.[58] By eroding the DRC's environmental enforcement institutions, the First and Second Congo Wars primed the country for illegal, large-scale, and ecologically destructive deforestation.

Lacking any mechanisms to protect the environment, the DRC's annual deforestation rate during the 2002 peace negotiations to end the Second Congo War were double the annual deforestation rate during the First Congo War.[59] Drawn to the newly conflict-free forests, hundreds of settlers and former soldiers opened small-scale mining camps for gold, coltan, and diamonds in protected reserves and national parks.[60] Thousands more extracted fuelwood and charcoal from the Virunga national park to supply nearby cities. As illegal logging, charcoal production, agriculture, and informal mining industries expanded, deforestation rose.[61]

From 2002 to 2020, the DRC lost five percent of its primary forest.[62] Over the last decade, deforestation in DRC's forest reserves and national parks has fueled the largest informal, unregulated mining workforce in the world and a largely informal timber industry. Today, millions of Congolese rely on the illicit industries and informal economic activity that fuel deforestation.[63]

The country now has one of the highest rates of deforestation globally.[64] Figure 4 depicts annual deforestation in the DRC using Google Earth Engine satellite imagery and Global Forest Change data. When comparing forest loss in 2001, during the Second Congolese Civil War, to forest loss in 2020, during the peace period, there is an almost ten billion square meter increase in deforestation.[65]

Figure 4: Annual deforestation in the DRC during conflict (2001) and peace (2020)



The government has not fulfilled its goals of increasing the country's forest cover from 58 to 63.5 percent by 2030 due to deficient finances, lack of political will, and weak enforcement capacity.[66] Rapid deforestation has amplified environmental stress across the DRC, destabilizing the country. Violence fueled by resource scarcity is now common.

Rising Violence and Mass Migration

Deforestation has led to competition over forest resources and a scarcity of arable land in the immediate post-war period. The 2003 peace agreement produced the Forest Code, which recognizes use rights of local and indigenous communities. Loggers require the formal approval of local communities to harvest forests, but lack of clarity over land rights has led to conflict.[67] In April 2011, local villagers protested against one of the largest logging companies in the DRC. Locals demanded the company invest in the village's infrastructure, as is required under law, but conflict exploded when police beat and raped the villagers. Failure to reinforce environmental institutions during the peace process made these recurrent conflicts predictable.[68]

More recently resource scarcity fueled by deforestation has also generated conflict. Warlords in North and South Kivu have clashed over access to illegal natural resource markets, while ethnic groups in the Ituri region, migrating in search of resources, fight over communal access to land, food, and water.[69] One attack on the Hema people in 2019 left 160 dead.[70] A recent report from Addis Ababa University found that natural resource competition contributed to the most recent spike in violence in 2017.[71] Open conflict during these years over access to land and resources has left hundreds dead and displaced tens of thousands of Congolese.[72]

Figure 5: Forest loss and casualties from armed conflict in the DRC (2002-2020)

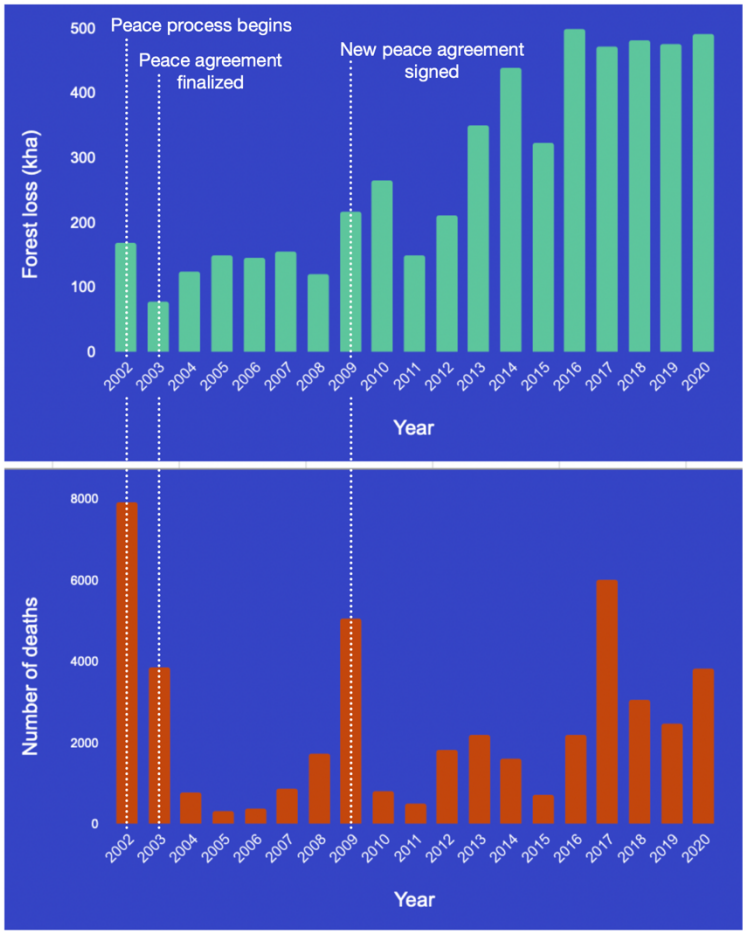


Figure 5 shows the relationship between violence and deforestation using annual forest loss data from Global Forest Watch and Uppsala Conflict Data. As deforestation rises, especially in the wake of the 2009 peace agreement, environmental stress makes conflict inevitable, resulting a steady rise and fall of conflict in the DRC. During the past few years, thousands of Congolese have died in conflict. Deforestation will continue to amplify environmental stress and generate violent conflict until the rate of forest loss slows.[73]

Ending the Cycle in the DRC: An Opportunity for the United States

The United States is the DRC's largest bilateral foreign aid donor and has contributed to post-conflict reconstruction since finalizing the 2003 peace agreement.[74] From 2001 to 2019, environmental foreign aid comprised less than one percent of total U.S. funds delivered to the country.[75] As a result of the low prioritization of the environment during the peace processes and post-war reconstruction, environmental management institutions in the DRC cannot function.[76]

Environmental insecurity fueled by deforestation and poor environmental enforcement capacity is directly linked to violence in the DRC, as well as food, water, climate, and economic insecurity.[77] As the country's largest donor of foreign aid, the United States has the opportunity to address the issue by increasing foreign aid earmarked to strengthen environmental institutions.

Protracted Stage: South Sudan

South Sudan has reached the protracted stage of the conflict-peace-deforestation cycle. Despite the fact that rapid deforestation played a central role in the outbreak of two civil wars in Sudan, the failure to prevent further forest loss in the newly independent South Sudan contributed to civil war in 2013.[78]

Civil War, Peace, and Post-War Deforestation

The 17-year First Sudanese Civil War ended in 1972 with a peace agreement that recognized the political autonomy of Southern Sudan.[79] In 1983, Sudan's leader Jaafar Nimeiry imposed sharia law on the Southern Sudan Autonomous Region, sparking the Second Sudanese Civil War.[80] In April 1985, South Sudan's newly formed Southern People's Liberation Army (SPLA) carried out a coup against Nimeiry. Conflict between the North and South continued for several years, and negotiations failed to end the violence through the remainder of the twentieth century.[81] After a three-year peace process, the 2005 Comprehensive Peace Agreement was implemented, giving South Sudan the opportunity to formally secede in 2011.[82]

During the period of peace following the First Sudanese Civil War, the expansion of industrialized farming and the growing demand for fuelwood decimated forests. The land cleared for mechanized farming increased from less than half a million hectares in 1968 to five million hectares in 1986. An equal area was farmed illegally. Mechanized farming, for instance, destroyed 95 percent of all forest area in eastern Sudan.[83] Arable land became increasingly scarce as large-scale agriculture destroyed soil health, water balance, and soil biota.[84] This large-scale land change displaced millions of Sudanese.[85]

Drought and desertification, loss of arable land, and increasing competition over resources during the interwar period were major causes of the Second Sudanese Civil War.[86] Persistent drought and fragile semi-desert in northern Sudan led to southward migration.[87] State and private agricultural

firms resented agro-pastoralists' desire to migrate to the south to continue pursuing traditional subsistence agriculture, rather working for the agricultural firms.[88] Over time, conflict emerged between migrants and southern Sudanese as they competed for limited resources and disagreed about environmental usage.[89]

As of 2007, not a single protection or forest management activity was located in South Sudan.[90] The new government did not possess the resources to manage forests after achieving independence.[91] In 2011, South Sudan's Minister of Wildlife declared that she was interested in conservation, but lacked the funding.

In the years preceding the South Sudanese Civil War, rapid land change fueled food insecurity and poverty. In response, pastoralists migrated to wetter areas, which often led to tension or armed conflict with locals. A 2011 UNEP study directly connected environmental stress in South Sudan with this pre-war instability.[92] Without environmental institutions to monitor and mitigate land misuse, migration led to confrontation between two pastoralist groups, triggering the South Sudanese Civil War in 2013.[93]

Figure 6: Annual deforestation in South Sudan during peace (2011) and conflict (2018)

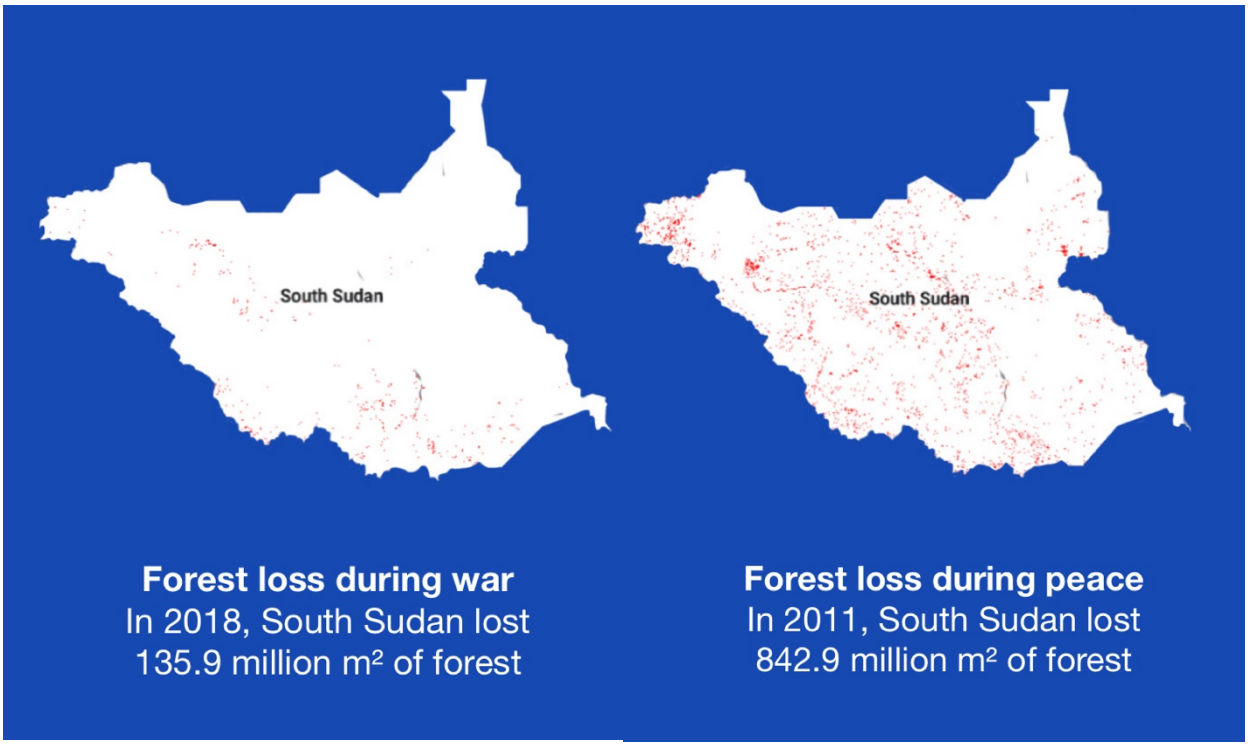


Figure 6 depicts annual deforestation in South Sudan using Google Earth Engine satellite imagery and the Global Forest Change data. When comparing forest loss in 2011, during the inter-war period of peace, to forest loss in 2018, during the South Sudanese civil war, there is a 700 million square meter decline in annual deforestation.[94] If environmental institutions cannot address the

issue of illegal deforestation, the cycle will continue in South Sudan until the state's forests are completely destroyed.

A Return to Civil War

The South Sudanese Civil War was a product of the political rivalry between the president and vice president of South Sudan, as well as the struggle between the Dinka and Nuer pastoralist groups.[95] Competition between these groups escalated as access to arable land and water declined. The war brought weapons into the country, which made resource conflicts more deadly.[96] Almost 400,000 lives were lost, and millions were displaced. Of those displaced, 85 percent were women and children.[97]

Unfortunately, the 2020 peace deal between President Kiir and Vice President Machar is tenuous. Widespread famine and tensions over land usage make sustainable peace unlikely in South Sudan.[98] Although deforestation rates dropped during the South Sudanese Civil War, forest loss will continue to incite violence unless strong environmental management measures are instituted.[99]

Figure 7: Forest loss and armed conflict casualties in South Sudan (2001-2020)

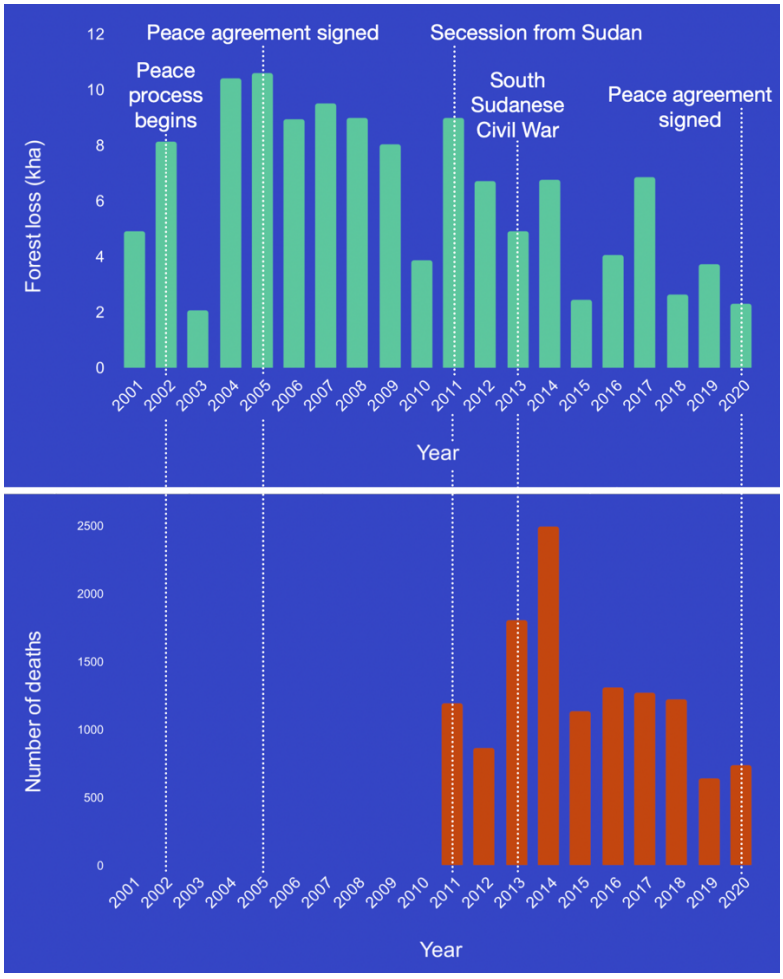


Figure 7 shows the relationship between violence and deforestation using annual forest loss data from Global Forest Watch and the conflict data from the Uppsala Conflict Data Program. Conflict data for South Sudan is only available for the period since its independence. As conflict surged at the start of the South Sudanese Civil War, deforestation fell. To prevent future conflict, the new state of South Sudan requires aid to build environmental enforcement capacity and help guide the government towards achieving sustainable development.[100]

Ending the Cycle in South Sudan: An Opportunity for the United States

The State Department played an instrumental role in securing the 2005 Comprehensive Peace Agreement for Sudan.[101] Foreign aid also peaked during the negotiation of the 2020 Sudanese Peace Agreement in South Sudan.[102] However, U.S. environmental aid to South Sudan is negligible, despite a warning from USAID that environmental shocks would complicate peacemaking and require continued emergency assistance from the United States.[103] At the same time, USAID recognized that humanitarian assistance is unsustainable. Focusing on local-level and NGO collaboration has been effective for USAID, especially with responding to natural disasters and other environmental shocks.

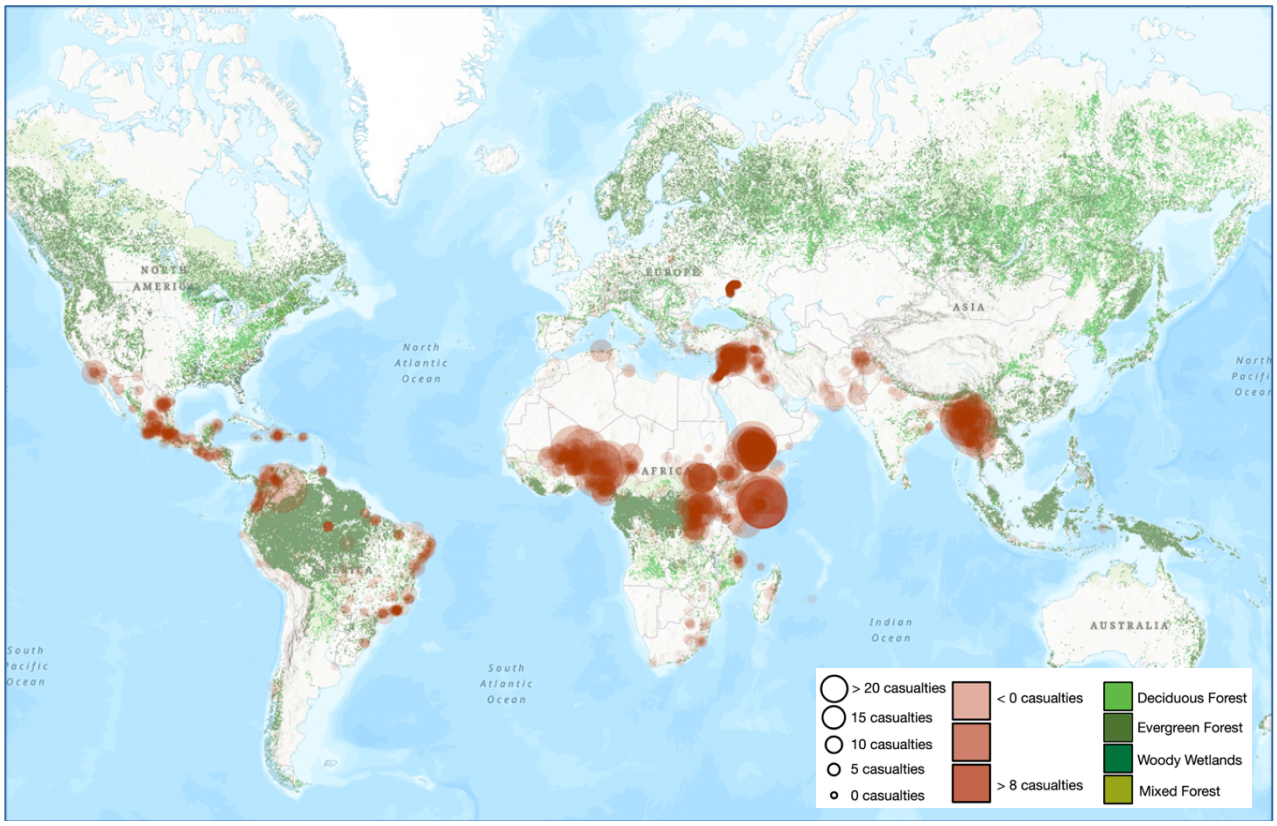
Looking forward, the United States must research, monitor, and evaluate aid distribution pathways to ensure that environmental protection is equitable and sustainable in the long term. Ensuring that South Sudan can manage its illegal deforestation problem is vital to achieving a sustainable peace.

Conclusion

Bad actors take advantage of weak environmental institutions to illegally extract resources from protected forests in post-civil war settings.[104] When these sudden land cover changes worsen resource scarcity, conflict or even civil war may result.[105] As climate change transforms environments across the planet, a U.S. foreign aid approach that targets illegal deforestation will mitigate this risk and increase the likelihood of long-term peace in post-civil war states.

Weak countries with forested regions are vulnerable to cycles of deforestation and conflict. The map below identifies these regions by measuring global forest coverage and reports of conflict during the last two weeks of February 2022 (see Figure 8). Using the ArcGIS World Forests layer and the ACLED conflict layer, we see high concentrations of conflict over forested regions—or hotspots for cycles of environmental violence.[106] Using this method, countries in Central America, Sub-Saharan Africa, and Southeast Asia are particularly vulnerable to developing cycles of deforestation and conflict.

Figure 8: Regions at highest risk for cycles of deforestation and conflict



The United States has an opportunity to mitigate this risk by delivering bilateral aid that invests in environmental institutions. When the combatants in a civil war negotiate a settlement, the United States can support environmental institutional capacity during peace processes and post-conflict reconstruction. U.S. aid can stabilize high-conflict states and regions and set the global standard for sustainable foreign assistance. The United States should take the lead in using its foreign aid to break cycles of environmental violence, creating sustainable futures for post-war states.

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[1] "Southern Sudan Environmental Threats and Opportunities Assessment: Biodiversity and Tropical Forest Assessment." (USAID, September 2007) https://pdf.usaid.gov/pdf_docs/PNADL108.pdf.
[2] Jesutimilehin O. Alamo, "The Democratic Republic of Congo (DRC) Conflict Insights" *Institute for Peace & Security Studies Addis Ababa University* (April 2021) https://media.africaportal.org/documents/DRC-Conflict-Insights-23042021.pdf.
[3] Shirley Llain Arenilla, Cindy Hawkins Rada, "Climate Change and Forced Migration." *Migraciones Internacionales* (12 May 2020) 11. art. 6. ghttps://migracionesinternacionales.colef.mx/index.p hp/migracionesinternacionales /article/view/1846.
[4] Paul J. Sullivan and Natalie Nasrallah, "Improving Natural Resource Management in Sudan," (United States Institute of Peace, June 2010) https://www.usip.org/publications/2010/06/improving-natural-resource-management-sudan.
[5] Deforestation degrades soil health. A decline in soil fertility reduces the availability of arable land, which can aggravate rural economies dominated by the agricultural sector. Removing trees from the ground also disrupts natural soil respiration processes, upsets the water cycle, and accelerates erosion. Soil's reduced ability to store water results in longer dry spells and shorter wet seasons. As a result, deforestation and soil degradation can turn fertile land into desert in areas with water scarcity issues. "What Is Erosion? Effects of Soil Erosion and Land Degradation." (World Wildlife Fund) https://www.worldwildlife.org/threats/soil-erosion-and-degradation; Robert McSweeney, "Explainer: Desertification and the Role of Climate Change." (Carbon Brief, 2 September 2020) https://www.carbonbrief.org/explainer-desertification-and-the-role-of-climate-change; James MacDonald, "Does Deforestation Lead to Drought?" (JSTOR Daily, 11 November 2015) https://daily.jstor.org/deforestation-lead-drought; large-scale land degradation and desertification reduce available water and cultivable land, amplifying land and resource competition that can produce conflict. Severe drought often coincides with deforestation and desertification, with catastrophic consequences for local food security and water availability. The World Food Programme reports that *changes* in food security, rather than the level of food available, is a major catalyst of violent conflict. Robert McSweeney, "Explainer: Desertification and the Role of Climate Change." (Carbon Brief, 2 September 2020) https://www.carbonbrief.org/explainer-desertification-and-the-role-of-climate-change; James MacDonald, "Does Deforestation Lead to Drought?" (JSTOR Daily, 11 November 2015) https://daily.jstor.org/deforestation-lead-drought/; "Occasional Paper 24 - Food Insecurity and Violent Conflict: Causes, Consequences, and Addressing the Challenges," (UN World Food Programme, July 15 2011) https://www.wfp.org/publications/occasional-paper-24-food-insecurity-and-violent-conflict-causes-consequences-and-addressing-.
[6] "What Is the Role of Deforestation in Climate Change and How Can 'Reducing Emissions from Deforestation and Degradation' (REDD+) Help?" *Grantham Research Institute on Climate Change and the Environment* (8 January 2018) https://www.lse.ac.uk/granthaminstitute/explainers/whats-redd-and-will-it-help-tackle-climate-change/#:~:text=Forests%20and%20trees%20store%20carbon,contribute%20to%20climate%20change%EF%BB%BF%20; "Deforestation and Forest Degradation." (World Wildlife Fund) https://www.worldwildlif e.org/threats/deforestation-and-forest-degradation.
[7] Large-scale land degradation and desertification reduce available water and cultivable land, amplifying land and resource competition that can produce conflict. Severe drought often coincides with deforestation and desertification, with catastrophic consequences for local food security and water availability. The World Food Programme reports that *changes* in food security, rather than the level of food available, is a major catalyst of violent conflict. Robert McSweeney, "Explainer: Desertification and the Role of Climate Change." (Carbon Brief, 2 September 2020) https://www.carbonbrief.org/explainer-desertification-and-the-role-of-climate-change; James MacDonald, "Does Deforestation Lead to Drought?" (JSTOR Daily, 11 November 2015) https://daily.jstor.org/deforestation-lead-drought/; "Occasional Paper 24 - Food Insecurity and Violent Conflict: Causes, Consequences, and Addressing the Challenges," (UN World Food Programme, July 15 2011) https://www.wfp.org/publications/occasional-paper-24-food-insecurity-and-violent-conflict-causes-consequences-and-addressing-.
[8] Helena S. Long, "Evaluating Environmental Degradation as a Cause of Burma's Rohingya Crisis" *Undergraduate Journal of Global Citizenship* 14, iss. 1, art. 2 (Fairfield University, 2021).
[9] Shirley Llain Arenilla and Cindy Hawkins Rada, "Climate Change and Forced Migration" *Migraciones Internacionales* 11, art. 6 (El Colegio de la Frontera Norte, 2020) 3.

[10] Jesutimilehin O. Alamo, "The Democratic Republic of Congo (DRC) Conflict Insights" *Institute for Peace & Security Studies* (April 2021) https://media.africaportal.org/documents/DRC-Conflict-Insights-23042021.pdf.
[11] Jesutimilehin O. Alamo, "The Democratic Republic of Congo (DRC) Conflict Insights" Peace and Security Report (Institute for Peace and Security Studies, Addis Ababa University, April 2021).
[12] "DR Congo: Ending the Cycle of Violence in Ituri" *Report No. 292* (International Crisis Group, 15 July 2020) https://www.crisisgroup.org/africa/central-africa/democratic-republic-congo/292-republique-democratique-du-congo-en-finir-avec-la-violence-cyclique-en-ituri.
[13] Katarina Zimmer, "Deforestation Is Leading to More Infectious Diseases in Humans." (Science, National Geographic, 22 November 2019) https://www.nationalgeographic.com/science/article/defore station-leading-to-more-infectious-diseases-in-humans; Remi Jedwab, Amjad M. Khan, Jason Russ, Esha D. Zaveri, "Epidemics, Pandemics, and Social Conflict: Lessons from the Past and Possible Scenarios for COVID-19" (World Development, July 5, 2021) https://cpb-us e1.wpmucdn.com/blogs.gwu.edu/dist/5/1304/files/2018/03/Epidemics_ Pandemics_Social_Conflict.pdf.
[14] Destroying that buffer between humans and nature will expose people to new pathogens. Mosquitoes find deforested lands the ideal habitat for breeding. Thus, deforestation is linked to the spread of zika, dengue, malaria, and other vector-borne diseases. For these reasons and several others, nearly one in three outbreaks are linked to rapid land-use change, such as deforestation. Katarina Zimmer, "Deforestation Is Leading to More Infectious Diseases in Humans." (Science, National Geographic, 22 November 2019) https://www.nationalgeographic.com/science/article/defore station-leading-to-more-infectious-diseases-in-humans.
[15] Katarina Zimmer, "Deforestation Is Leading to More Infectious Diseases in Humans." (Science, National Geographic, 22 November 2019) https://www.nationalgeographic.com/science/article/defore station-leading-to-more-infectious-diseases-in-humans.
[16] James B. Moran, Jin X. Goh, Nicholas Kerry, and Damian R. Murray, "Outbreaks and Outgroups: Three Tests of the Relationship Between Disease Avoidance Motives and Xenophobia During an Emerging Pandemic" Evolutionary Psychological Science 7, no. 4 (National Library of Medicine, 2021).
[17] "What Is the Role of Deforestation in Climate Change and How Can 'Reducing Emissions from Deforestation and Degradation' (REDD+) Help?" *Grantham Research Institute on Climate Change and the Environment* (8 January 2018) https://www.lse.ac.uk/granthaminstitute/explainers/whats-redd-and-will-it-help-tackle-climate-change/#:~:text=Forests%20and%20trees%20store%20carbon,contribute%20to%20climate%20change%EF%BB%BF%20.
[18] "Seven things you need to know about climate change and conflict" (International Committee of the Red Cross, 9 July 2020) https://www.icrc.org/en/document/climate-change-and-conflict.
[19] Sarah Bermeo and David Leblang, "Climate, Violence, and Honduran Migration to the United States," (Brookings, April 1, 2021), https://www.brookings.edu/blog/future-development/2021/04/01/climate-violence-and-honduran-migration-to-the-united-states/.
[20] Sandra Cuffe, "Hondurans remain hopeful as Guatemala cracks down on caravan" (Al Jazeera, 17 January 2021) https://www.aljazeera.com/news/2021/1/17/hondurans-hopeful-despite-guatemala-crackdown-migrant-caravan.
[21] Tetsuji Ida, "Climate Refugees – the World's Forgotten Victims," (World Economic Forum, 18 June 2021) https://www.weforum.org/agenda/2021/06/climate-refugees-the-world-s-forgotten-victims/.
[22] Ayyoob Sharifi, Dahlia Simangan, Shinji Kaneko, "The Literature Landscape on Peace-Sustainability Nexus: A Scientometric Analysis." *AMBIO A Journal of the Human Environment*, https://www.researchgat e.net/publication/344406106_The_literature_landscape_on_peace-sustainability_nexus_A_scient ometric_analysis.
[23] Mohamed Suliman, "Civil War in Sudan: The Impact of Ecological Degradation." (University of Pennsylvania - African Studies Center 1997) https://www.africa.upenn.edu/Articles_ Gen/cvlw_env_sdn.html.
[24] Emily M. Morgenstern and Nick M. Brown, "Foreign Assistance: An introduction to U.S. Programs and Policy" *R40213* (Congressional Research Service, 10 January 2022) https://crsreports.congress.gov/product/pdf/R/R40213
[25] Van Butsic, Matthias Baumann, Anja Shortland, Sarah Walker, Tobias Kuemmerle, "Conservation and Conflict in the Democratic Republic of Congo: The Impacts of Warfare, Mining, and Protected Areas on Deforestation." *Biological Conservation* (Elsevier, 10 July 2015) https://www.sciencedirect.com/science/article/abs/pii/S0006320715300045.
[26] "Sudan Post-Conflict Environmental Assessment." (Nairobi: United Nations Environment Programme, June 2007) https://www.unep.org/explore-topics/disasters-conflicts/where-we-work/sudan/sudan-post-conflict-environmental-assessmentxx
[27] "Foreign Assistance" (USAID, Department of State, 17 December 2021) https://foreignassistance.gov.

[28] Paul J. Sullivan and Natalie Nasrallah, "Improving Natural Resource Management in Sudan," (United States Institute of Peace, June 2010) https://www.usip.org/publications/2010/06/improving-natural-resource-management-sudan.
[29] Tetsuji Ida, "Climate Refugees – the World's Forgotten Victims," (World Economic Forum, 18 June 2021) https://www.weforum.org/agenda/2021/06/climate-refugees-the-world-s-forgotten-victims/.
[30] Jing Victor Li, Tsun Se Cheong, Xunpeng Shi, "A Counterfactual Baseline for Assessing Future Environmental Impact: A Case Study of the Belt and Road Initiative." *Frontiers in Environmental Science* (Frontiers, Oct. 2021) https://www.frontiersin.org/articles/10.3389/fenvs.2021.724095/full.
[31] Jing Victor Li, Tsun Se Cheong, Xunpeng Shi, "A Counterfactual Baseline for Assessing Future Environmental Impact: A Case Study of the Belt and Road Initiative." *Frontiers in Environmental Science* (Frontiers, Oct. 2021) https://www.frontiersin.org/articles/10.3389/fenvs.2021.724095/full.
[32] "What Is the Role of Deforestation in Climate Change and How Can 'Reducing Emissions from Deforestation and Degradation' (REDD+) Help?" *Grantham Research Institute on Climate Change and the Environment* (8 January 2018) https://www.lse.ac.uk/granthaminstitute/explainers/whats-redd-and-will-it-help-tackle-climate-change/#:~:text=Forests%20and%20trees%20store%20carbon,contribute%20to%20climate%20change%EF%BB%BF%20.zf
[33] Juan P. Mendoza, "Colombia's Transition to Peace Is Enhancing Coca-Driven Deforestation." *Environmental Research Letters* (IOP Publishing, 6 October 2020) https://iopscience.iop.org/article/ 10.1088/1748-9326/abb331#:~:text=The%20results%20indicate%20that%2C%20as,(Clerici%20 et%20al%202020).
[34] Mounu Prem, Santiago Saavedra, Juan F. Vargas, "End-of-Conflict Deforestation: Evidence from Colombia's Peace Agreement." *World Development* (Pergamon, December 2018) https://www.sciencedirect.com/science/article/abs/pii/S0305750X19305017#:~:text=Using%20yearly%20deforestation%20data%20from,the%20start%20of%20the%20ceasefire.
[35] David Sosa, "Peace Colombia: The Success of U.S. Foreign Assistance in South America." (US Global Leadership Coalition, 13 May 2017) https://www.usglc.org/blog/peace-colombia-the-success-of-u-s-foreign-assistance-in-south-america/.
[36] Ibid., 6.
[37] The conflict began in the mid-1960s with the formation of the FARC and the ELN, left-wing guerilla groups that intended to overthrow the Colombian government. In the 1990s, right-wing paramilitary groups and illegal drug traffickers colluded to form a third side of the conflict: the AUC. Colombia initiated peace talks in 1998, followed by the Clinton administration's decision to deliver an emergency supplemental aid package in 2000. In October 2012, the peace process commenced in Cuba. Only two months later, the FARC withdrew its troops to remote areas, resulting in a 98 percent drop in violence. Since the initial round had failed, the United States was given the authority to direct peace talks between the Colombian government and the FARC in 2010. By 2016, after fifty-two years of armed conflict, the Colombian government and the FARC reached a peace agreement.
[38] Paulo J. Murillo-Sandoval, Kristina Van Dexter, Jamon Van Den Hoek, David Wrathall, and Robert Kennedy, "The end of gunpoint conservation: forest disturbance after the Colombian peace agreement" *Environmental Research Letters 15* (IOP Publishing, 2020).
[39] Ibid.
[40] Ibid.
[41] Juan P. Mendoza, "Colombia's Transition to Peace Is Enhancing Coca-Driven Deforestation." *Environmental Research Letters* (IOP Publishing, 6 October 2020) https://iopscience.iop.org/article/ 10.1088/1748-9326/abb331#:~:text=The%20results%20indicate%20that%2C%20as,(Clerici%20 et%20al%202020).
[42] "A Broken Canopy: Deforestation and Conflict in Colombia." (Crisis Group, 18 November 2021) https://www.crisisgroup.org/latin-america-caribbean/andes/colombia/091-broken-canopy-deforestation-and-conflict-colombia#:~:text=Colombia's%20vast%20forest%20is%20fast,environmental%20harm%20and%20deadly%20conflict.
[43] Oscar V. Bautista-Cespedes, Louise Willemen, Augusto Castro-Nunez, Thomas A. Groen, "The Effects of Armed Conflict on Forest Cover Changes across Temporaland Spatial Scales in the Colombian Amazon."*Regional Environmental Change* (Springer) https://www.researchgate.net/publication/352667381_The_effects_of_armed_conflict_on_forest_cover_changes_across_temporal_and_spatial_scales_in_the_Colombian_Amazon.
[44] "A Broken Canopy: Deforestation and Conflict in Colombia." (Crisis Group, 18 November 2021) https://www.crisisgroup.org/latin-america-caribbean/andes/colombia/091-broken-canopy-deforestation-and-conflict-

colombia#:~:text=Colombia's%20vast%20forest%20is%20fast,envi
ronmental%20harm%20and%20deadly%20conflict.
[45] Nicola Clerici, Dolores Armenteras, Peter Kareiva, Rodrigo Botero, Juan Pablo Ramírez-Delgado, German Forero-Medina, Jose Manuel Ochoa-Quintero, Carlos Pedraza, Laura Schneider, C. Lora, Carolina Gómez-Posada, Mauricio Linares, Claire Hirashiki, Duan Biggs, "Deforestation in Colombian Protected Areas Increased during Post-Conflict Periods." *Nature* (Nature Publishing Group, 18 March 2020) https://www.nature.com/articles/s41598-020-61861-y#:~:text=Deforestation%20in%20Colombian%20protected%20areas%20in
creased%20during%20post%2Dconflict%20periods,-N.
[46] Google Earth Engine (Google) https://earthengine.google.com/.
[47] "Colombia Deforestation Rates & Statistics: GFW," (Global Forest Watch); "Uppsala Conflict Data Program," (Colombia) https://ucdp.uu.se/country/100.
[48] "15th Anniversary of Plan Colombia: Learning From Its Successes and Failures."(Washington Office on Latin America, 1 February 2016) https://www.wola.org/files/1602_plancol/; "America First, Colombia Second? Peace with FARC in the Age of Trump." *The Kenan Institute for Ethics at Duke University* (10 August 2018) https://kenan.ethics.duke.edu/america-first-colombia-second-peace-with-farc-in-the-age-of-trump/.
[49] *FA.gov*, (USAID, Department of State, 17 December 2022) https://foreignassistance.gov/cd/colombia /.
[50] Dimitri Selibas, "Colombia's Forests Lurch between Deforestation and the Hope for a Sustainable Future." (Mongabay Environmental News, 24 December 2020) https://news.mongabay.com /2020/12/colombias-forests-lurch-between-deforestation-and-the-hope-for-a-sustainable-future/#:~:text=Colombia's%20forests%20lurch%20between%20deforestation%20and%20the%20hope%20for%20a%20sustainable%20future,-by%20Dimitri%20Selibas&text=More%20than%20half%20of%20Colombia's,but%20suffers%20from%20widespread%20deforestation.
[51] Morgan Erickson-Davis, "Deforestation Intensifies in Northern DRC Protected Areas." (Mongabay Environmental News, 11 June 2021) https://news.mongabay.com/2021/06/deforestatio n-intensifies-in-northern-drc-protected-areas/.
[52] Van Butsic, Matthias Baumann, Anja Shortland, Sarah Walker, Tobias Kuemmerle, "Conservation and Conflict in the Democratic Republic of Congo: The Impacts of Warfare, Mining, and Protected Areas on Deforestation." *Biological Conservation* (Elsevier, 10 July 2015) https://www.sciencedirect.com/science/article/abs/pii/S0006320715300045.
[53] The DRC's new President Laurent Kabila had gained power with the support of Rwanda, Uganda, and Angola during the first war, but ordered all foreign troops to leave the country on July 26—a disastrous show of ingratitude. To overthrow Kabila, Rwandan, Ugandan, and Burundi troops launched an offensive in east DRC, with Rwandan, Ugandan, and Banyamulenge troops striking the west.
[54] Emizet F. Kisangani, *Civil Wars in the Democratic Republic of Congo: 1960-2010* (Lynne Rienner Publishers, 2012)
[55] Ibid., 151-2.
[56] In October 1996, violent fighting broke out in South Kivu between the military of the DRC's President Joseph Mobutu and the combined forces of the province's Tutsi community, the military of the Rwandan Patriotic Front, and a coalition of four Congolese political parties called the AFDL. By May 1997, the leader of the AFDL Laurent Kabila marched into the capital city of Kinshasa and declared himself president. Then, former allies of Kabila launched an insurrection against him, which lasted five months. The uprising ended in July 1998 once Kabila ordered all foreign troops to leave the DRC. This was the First Congo War. The Second Congo War began in August 1998. Laurent Kabila was assassinated, foreign troops from Rwanda and Uganda occupied the DRC, and more than four million people were killed. An Inter-Congolese Dialogue was established in South Africa in 2002 with the strong support of third parties like the United States. The UN applied enough pressure on the major parties to get a signed agreement by December 2002, called the Global Act of the Transition. After several institutional changes set about in the peace agreement, violent conflict in the DRC dropped significantly.
[57] In 2003, all rebel groups were required to send their troops to serve in the Armed Forces of the Democratic Republic of Congo. Years later, one group refused to join, which launched a rebellion called the National Congress for the Defense of People (CNDP). It was not until 2009 that the CNDP and the DRC signed the Goma Agreement, ending the violence for a period of time. Unfortunately, in 2012 CNDP members abandoned the Armed Forces to form the M23 rebel group, which was subsequently crushed with the support of the UN in 2013. The most recent spike in violence occurred in 2017, when a group of militias coalesced to question President Joseph Kabila's authority after his term ended in 2016. He finally stepped down in 2019 after the nation's first democratic transition since independence in 1960. John Ahere, "The Peace Process in the DRC." (ACCORD, 6 December 2012) https://www.accord.or g.za/publication/peace-process-drc/.

[58] Laurent Debroux, Giusseppe Topa, David Kaimowitz, Alain Karsenty, Teresa Hart, "Forests in Post-Conflict Democratic Republic of Congo: Analysis of a Priority Agenda - Cifor Knowledge." (CIFOR, 18 April 2020) https://www.cifor.org/knowledge/publication/2188/.
[59] Ibid., 21.
[60] Ibid., 15.
[61] Ibid., 21.
[62] Ibid
[63] "UNEP Study Confirms DR Congo's Potential as Environmental Powerhouse but Warns of Critical Threats" (UNEP, 7 August 2017).
[64] Victoria Schneider, "Poor Governance Fuels 'Horrible Dynamic' of Deforestation in DRC." (Mongabay Environmental News, 21 December 2020) https://news.mongabay.com/2020/12/poor-governance-fuels-horrible-dynamic-of-deforestation-in-drc/#:~:text=Poor%20governance%20fue ls%20'horrible%20dynamic'%20of%20deforestation%20in%20DRC,-by%20Victoria%20Schnei der&text=Forests%20in%20the%20Democratic%20Republic,during%20the%20COVID%2D19%20pandemic; "Children in DRC at 'Extremely High Risk' of the Impacts of the Climate Crisis." (UNICEF, 20 Aug. 2021) https://www.unicef.org/drcongo/en/press-releases/children-drc-extremely-high-risk-impacts-climate-crisis#:~:text=KINSHASA%2C%2020%20AUGUST%202021%20%E2%80% 93%20Young,a%20UNICEF%20report%20launched%20today.
[65] Google Earth Engine (Google) https://earthengine.google.com/.
[66] Morgan Erickson-Davis, "Deforestation Intensifies in Northern DRC Protected Areas." (Mongabay Environmental News, 11 June 2021) https://news.mongabay.com/2021/06/deforestatio n-intensifies-in-northern-drc-protected-areas/.
[67] Sam Lawson, "Illegal Logging in the Democratic Republic of Congo - Energy, Environment and Resources Documents." *Energy, Environment and Resources EER PP* (April 2014) https://lan dportal.org/ru/node/14122.

[69] Jesutimilehin O. Alamo, "The Democratic Republic of Congo (DRC) Conflict Insights" *Institute for Peace & Security Studies* (April 2021) https://media.africaportal.org/documents/DRC-Conflict-Insights-23042021.pdf.
[70] John Madeira, "Climate Change & Ethnic Conflict in Africa Part II: DRC." *American Security Project* (24 June 2019) https://www.americansecurityproject.org/climate-change-ethnic-conflict-in-africa-part-ii-drc/.
[71] Jesutimilehin O. Alamo, "The Democratic Republic of Congo (DRC) Conflict Insights" *Institute for Peace & Security Studies* (April 2021) https://media.africaportal.org/documents/DRC-Conflict-Insights-23042021.pdf.
[72] John Madeira, "Climate Change & Ethnic Conflict in Africa Part II: DRC." *American Security Project* (24 June 2019) https://www.americansecurityproject.org/climate-change-ethnic-conflict-in-africa-part-ii-drc/.
[73] "Democratic Republic of the Congo Deforestation Rates & Statistics: GFW," (Global Forest Watch); "Uppsala Conflict Data Program," (DR Congo (Zaire)) https://ucdp.uu.se/country/100.
[74] "Democratic Republic of Congo Country Study." *Humanitarian Financing Task Team Output IV* (April 2019) https://www.nrc.no/globalassets/pdf/reports/190621-output-iv-drc-report.pdf.
[75] "Congo (Kinshasa)." (FA.gov) https://foreignassistance.gov/cd/congo%20(kinshasa)/.
[76] Morgan Erickson-Davis, "Deforestation Intensifies in Northern DRC Protected Areas." (Mongabay Environmental News, 11 June 2021) https://news.mongabay.com/2021/06/deforestatio n-intensifies-in-northern-drc-protected-areas/.
[77] Jesutimilehin O. Alamo, "The Democratic Republic of Congo (DRC) Conflict Insights" *Institute for Peace & Security Studies* (April 2021) https://media.africaportal.org/documents/DRC-Conflict-Insights-23042021.pdf.
[78] Mohamed Suliman, "Civil War in Sudan: The Impact of Ecological Degradation" Environment and Conflicts Project (ENCOP) (African Studies Center, University of Pennsylvania, 18 December 1994); Jay L. Spaulding, Mohy el Din Sabr, Robert O. Collins, Ahmad Alawad Sikainga, "South Sudan." (Encyclopædia Britannica, Inc.7, June 2019) https://www.britannica.com/place/South-Sudan; Andrew Samms, "The South Sudanese Civil War (2013-)." (Black Past, 3 September 2018) https:// www.blackpast.org/global-african-history/south-sudanese-civil-war-2013/.
[79] Ibid.
[80] The seventeen-year-long First Sudanese Civil War ended in 1972 with a peace agreement called the Addis Ababa Accord. This agreement recognized the political autonomy of Southern Sudanese, giving the region its own legislative and executive institutions. Sudan's leader Jaafar Nimeiry went on to violate the terms of the agreement on several occasions. For example, in 1978 he tried to take over oil fields on the north-south border. In 1983, Nimeiry imposed sharia law on the Southern Sudan Autonomous Region, sparking the Second Sudanese Civil War. By April 1985, South Sudan's newly formed Southern People's Liberation Army (SPLA) carried out a coup against Nimeiry. Violent conflict between the North and South in the ensuing years would incentivize both sides to seek a quick end to the

conflict, but underlying challenges made the negotiation more difficult. One reason for the prolonged civil war was the business community of Northern Sudan's desire to expand southwards. The powerful community wanted to dismantle the democratic peace between the North and the South and thus staged an attempted coup against the new civilian government, which intensified the war; Samuel Momodu, "Second Sudanese Civil War (1983-2005)." (Black Past, 23 December 2018) https://www.blackpast.org/global-african-history/events-global-african-history/second-sudanese-civil-war-1983-2005/.

[81] Samuel Momodu, "Second Sudanese Civil War (1983-2005)." (Black Past, 23 December 2018) https://www.blackpast.org/global-african-history/events-global-african-history/second-sudanese-civil-war-1983-2005/.

[82] Peace agreements failed throughout the remainder of the twentieth century. After a three-year peace process, the 2005 Comprehensive Peace Agreement was officiated, which would give South Sudan the opportunity for secession in 2011. Just two years after the country voted to secede, the South Sudanese Civil War broke out between the government and the rebel group, SPLM-IO, or Sudan People's Liberation Movement in Opposition. Almost four hundred thousand lives were lost, and millions were displaced. Of the 1 in 3 citizens displaced, 85 percent were women and children. The struggle was a manifestation of both political rivalry between the original president and vice president of South Sudan and the ethnic struggle between the Dinka and Nuer groups. Unfortunately, the 2020 peace deal between President Kiir and Vice President Machar is tenuous. Widespread famine and tensions over land usage have fueled the unpredictability of sustainable peace in South Sudan. Samuel Momodu, "Second Sudanese Civil War (1983-2005)." (Black Past, 23 December 2018) https://www.blackpast.org/global-african-history/events-global-african-history/second-sudanese-civil-war-1983-2005/.

[83] Mohamed Suliman, "Civil War in Sudan: The Impact of Ecological Degradation." (University of Pennsylvania African Studies Center 1997) https://www.africa.upenn.edu/Articles_ Gen/cvlw_env_sdn.html.

[84] "Sudan Post-Conflict Environmental Assessment" (United Nations Programme, June 2007) 64. https://postconflict.unep.ch/publications/UNEPSudan.pdf.

[85] Mohamed Suliman, "Civil War in Sudan: The Impact of Ecological Degradation." (University of Pennsylvania - African Studies Center 1997) https://www.africa.upenn.edu/Articles_ Gen/cvlw_env_sdn.html.

[86] Ibid.

[87] Mohamed Suliman, "Civil War in Sudan: The Impact of Ecological Degradation." (University of Pennsylvania - African Studies Center 1997) https://www.africa.upenn.edu/Articles_ Gen/cvlw_env_sdn.html.

[88] "South Sudan Private Sector Mapping" (USAID) https://pdf.usaid.gov/pdf_docs/PA00MT8P.pdf; Ingrid Kircher, "Oxfam Research Report March 2013 Challenges to Security, Livelihood, and Gender Justice in South Sudan" (Oxfam, March 2013) https://oi-files-d8-prod.s3.eu-west-2.amazonaws.com/s3fs-public/file_attachments/rr-challenges-security-livelihoods-gender-south-sudan-130313-en_0.pdf; "South Sudan Private Sector Mapping" (USAID) https://pdf.usaid.gov/pdf_docs/PA00MT8P.pdf.

[89] "South Sudan: First State of Environment and Outlook Report 2018." (UN Environmental Programme, 11 June 2018) https://www.unep.org/resources/report/south-sudan-first-state-environment-and-outlook-report-2018; Samuel Momodu, "Second Sudanese Civil War (1983-2005)." (Black Past, 23 December 2018) https://www.blackpast.org/global-african-history/events-global-african-history/second-sudanese-civil-war-1983-2005/.

[90] "Southern Sudan Environmental Threats and Opportunities Assesssment: Biodiversity and Tropical Forest Assessment." (USAID, September 2007) https://pdf.usaid.gov/pdf_docs/PNADL108.pdf.

[91] Karimej Moukaddem, "South Sudan's Tropical Forests Fast Disappearing." (Mongabay Environmental News, 6 June 2011) https://news.mongabay.com/2011/06/south-sudans-tropical-forests-fast-disappearing/#:~:text=South%20Sudan's%20tropical%20montane%20forests,of%20tree.%20cover%20by%202020.

[92] "South Sudan: First State of Environment and Outlook Report 2018." (UN Environmental Programme, 11 June 2018) https://www.unep.org/resources/report/south-sudan-first-state-environment-and-outlook-report-2018.

[93] Andrew Samms, "The South Sudanese Civil War (2013-)." (Black Past, 3 September 2018) https://www.blackpast.org/global-african-history/south-sudanese-civil-war-2013/.

[94] Google Earth Engine (Google) https://earthengine.google.com/.

[95] Andrew Samms, "The South Sudanese Civil War (2013-)." (Black Past, 3 September 2018) https://www.blackpast.org/global-african-history/south-sudanese-civil-war-2013/.

[96] "Conflict between Dinka and Nuer in South Sudan." (Climate Diplomacy, 2022) https://climate-diplomacy.org/case-studies/conflict-between-dinka-and-nuer-south-sudan#:~:text=The%20Dinka%20and%20Nuer%2C%20two,causing%20massive%20amounts%20of%20fatalities.

[97] Erol Yayboke, "Accessing South Sudan: Humanitarian Aid in a Time of Crisis." (Center for Strategic and International Studies, 27 November 2018) https://www.csis.org/analysis/accessing-south-sudan-humanitarian-aid-time-crisis.
[98] Sam Mednick, "South Sudan's Precarious Peace." (The New Humanitarian, 21 January 2021) https://www.thenewhumanitarian.org/news-feature/2021/01/21/south-sudan-peace-deal-violence-famine.
[99] "Sudan Post-Conflict Environmental Assessment." (Nairobi: United Nations Environment Programme, June 2007) https://www.unep.org/explore-topics/disasters-conflicts/where-we-work/sudan/sudan-post-conflict-environmental-assessment.
[100] "South Sudan Deforestation Rates & Statistics: GFW," (Global Forest Watch); "Uppsala Conflict Data Program," (Colombia) https://ucdp.uu.se/country/100.
[101] Kiertisak Toh and Prahlad Kasturi. "Foreign Aid in Post-Conflict Countries: The Case of South Sudan." *Journal of Third World Studies 29, No. 2*, https://www.researchgate.net/publicatio n/289302810_Foreign_aid_in_post-conflict_countries_The_case_of_South_Sudan.
[102] "ForeignAssistance.gov." (Foreign Assistance, 17 December 2021) https://foreignassistance.gov/.
[103] Kiertisak Toh and Prahlad Kasturi. "Foreign Aid in Post-Conflict Countries: The Case of South Sudan." *Journal of Third World Studies 29, No. 2*, https://www.researchgate.net/publication/289302810_Foreign_aid_in_post-conflict_countries_The_case_of_South_Sudan
[104] Nicola Clerici, Dolores Armenteras, Peter Kareiva, Rodrigo Botero, Juan Pablo Ramírez-Delgado, German Forero-Medina, Jose Manuel Ochoa-Quintero, Carlos Pedraza, Laura Schneider, C. Lora, Carolina Gómez-Posada, Mauricio Linares, Claire Hirashiki, Duan Biggs, "Deforestation in Colombian Protected Areas Increased during Post-Conflict Periods." *Nature* (Nature Publishing Group, 18 March 2020) https://www.nature.com/articles/s41598-020-61861-y#:~:text=Deforestation%20in%20Colombian%20protected%20areas%20in creased%20during%20post%2Dconflict%20periods,-N.
[105] Paul J. Sullivan and Natalie Nasrallah, "Improving Natural Resource Management in Sudan," (United States Institute of Peace, June 2010) https://www.usip.org/publications/2010/06/improving-natural-resource-management-sudan.
[106] "ACLED Dashboard." (ACLED) https://acleddata.com/dashboard/#/dashboard.