Witnessing the **Environmental Impacts** of **War**

Environmental case studies from conflict zones around the world

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Introduction

Armed conflict changes everything. It is the ultimate, human-induced crisis. Armed conflict destroys lives, livelihoods, and creates chaos. Armed conflicts mark civilians and the environment, sometimes for generations after the weapons are put down. There is an inextricable link between the protection of the environment and the protection of civilians.

Across conflict-affected areas, stories of affected infrastructure, water resource challenges, deforestation, and oil pollution, backed by satellite imagery, open source investigations, and official accounts, show there is a long road to recovery.

And when the guns are put down, when the fighting stops, that doesn't mean the path is clear. Legacy munitions, land grabbing and governance vacuums can all contribute to unprecedented environmental damage. These impacts may be compounded by climate change.

Yet not all is lost. More and more, issues around conflict and the environment are gaining traction. States and global institutions are recognising they need capacity to identify, act on and mitigate the environmental risks that can destabilise societies, and that can occur because of armed conflicts. Humanitarian actors are actively incorporating environmentally sensitive approaches in post-conflict efforts to reduce future harm.

To build sustainable peace and support communities there is a clear need to assess environmental risks, protect civilians from environmental harm, and assist victims after conflicts, remediate damage, and employ the environmentally sound tools at our disposal to regenerate ecosystems.

While some efforts are underway to strengthen, implement and respect the laws protecting the environment in relation to armed conflicts, and hold those responsible for harm to account, more must be done. The COVID-19 pandemic is an example of cooperation and coordination across borders preventing and mitigating destructive chaos. Crisis response actions demonstrated by the pandemic, and long-term recovery plans reinforce the necessity to protect the environment and people who depend on it. Bold leadership, supported by science-based solutions, protects ecosystems, and saves lives.

This publication represents a diverse group of organisations working on human rights, peacebuilding, legal experts, humanitarian demining organisations and environmental groups to show the breadth and complexity of conflict-linked environmental harm. The case studies presented outline why attention to the environment in relation to armed conflicts is necessary. From illegal forestry in post conflict Colombia to the scenes of wanton agricultural destruction in Iraq, the conflict induced governance gaps leave not only civilians but the environment directly in harm's way. Ongoing environmental risks from fighting in industrialised areas in Ukraine and Syria illustrate the toxic legacies of warfare.

New tools and technologies like those monitoring agricultural stresses in Yemen or deforestation and pollution in Syria, enable monitoring and identification of issues for post-conflict attention. And in areas where the fighting has stopped, efforts to protect the environment from future harm while clearing the explosive legacy of conflict offer an opportunity to address the twin threats of unexploded ordnance and non-biodegradable wastes. There is also hope, as communities come together to protect water and build a lasting and resilient peace.

1. Islamic State's Environmental War Crimes in Iraq

Richard Pearshouse
Amnesty International

As we drive up, the desolate farm in the shadow of north-western Iraq's Sinjar mountain looks like many others in the area. The farmhouse is abandoned, the fields are barren. A neighbour, curious about our visit, wanders over and explains that the owner used to grow olives, wheat, and vegetables. But, like half of the farmers in this village, he and his family haven't returned since fleeing from the armed group calling itself Islamic State (IS) four years ago.

Why? One clue is the large water tank near the farm's irrigation well: empty. Another is the lengths of plastic irrigation pipes nearby: broken and scattered. On closer inspection, the entrance to the irrigation well is stained with oil, with oil stains also visible in and around ruptures in the black plastic irrigation pipe leading from the well. Oil doesn't spontaneously appear in irrigation wells in this part of Iraq. This farm, and many others like it, are war crime scenes.

Iraq declared military victory over IS just over a year before our visit, but the effects of this conflict are still clearly evident.

Sinjar district was home to much of Iraq's Yezidi community before 2014. It was also the site of many of IS's most brutal crimes. IS fighters rounded up and killed the men and boys who hadn't been able to seek sanctuary on Sinjar Mountain, then abducted and sold an estimated 6,000 young women and children into slavery elsewhere in Iraq and in Syria.

These crimes made headlines around the world. What is less well-known is that, when IS was forced to retreat, its fighters took to eviscerating the landscape in ways that gave no immediate military advantage. According to a detailed Amnesty International investigation, IS deliberately targeted the rural environment that underpins Yezidi farmers' livelihoods.

Some of the clearest examples of IS's deliberate, wanton destruction are related to irrigation wells like those we witnessed on that desolate farm in Sinjar. These wells were often sabotaged with rubble, oil, or other foreign objects. As one water engineer explained, "I am quite sure it was intentional: these sorts of items do not end up in the borehole or well pipes unless they are placed there." Blockage was often accompanied by theft and/or destruction of the pump, cables, generators, and transformers. According to local officials, 400 of 450 irrigation wells in one sub-district alone were put out of use.

Sinjar district is one of the driest areas in the world where agriculture can be practised. IS's destruction of irrigation wells in the area is widespread and has far-reaching consequences. As a local agricultural official told us, "The worst thing is when you destroy a well: the trees and crops will die, the rest of the farm dies too… IS's goal was to destroy the resources of a people that depend on crops and livestock."

Destruction of an adversary's property not required by military necessity constitutes a war crime. Such acts may also be crimes against humanity, targeting the Yezidis and other rural communities in Iraq. With a UN investigative team already collecting evidence of IS crimes in Iraq, efforts to hold IS responsible for crimes under international law should, where sufficient evidence exists, include these specific crimes.

An empty water tank and a sabotaged irrigation well on an abandoned farm north of Sinjar mountain, © Alice Martins

2. Conflict-driven Deforestation and Pollution in Syria

Wim Zwijnenburg
PAX

Yifang Shi, PhD
PAX

For nine years the war in Syria has brought mayhem and misery to its population. Millions are displaced, hundreds of thousands killed, many more wounded and the country is in ruins. Fighting in urban, industrial, and agricultural areas has left a trail of environmental destruction that will remain for decades. PAX published 'Amidst the Debris', a study on environmental dimensions of the armed conflict in Syria in 2015, followed by 'Scorched Earth and Charred Lives', a satellite analysis on the rise of artisanal oil refining in Deir ez Zor, in 2016.

Investigation and monitoring the impacts of conflict events on the environment and subsequently, civilians, is crucial for addressing health and livelihood concerns in humanitarian response and post-conflict reconstruction work. Security concerns often hinder access to conflict areas limiting data collection on environmental damage, including biodiversity and natural resources. Therefore, geographical information systems (GIS) and remote sensing using satellite data provide an essential tool for land degradation monitoring, burned area analysis, pollution identification and vegetation change detection. Other types of information can be collected through open-source investigation methods, including analysis of social media coming out of conflict-affected areas. PAX is working to innovate these methodologies and apply them to the identification and monitoring of environmental damage in Syria.

A brief look at the critical issue of conflict pollution from the oil industry in eastern Syria and alarming rates of deforestation in the west of the country illustrate the unique environmental challenges from the ongoing war.

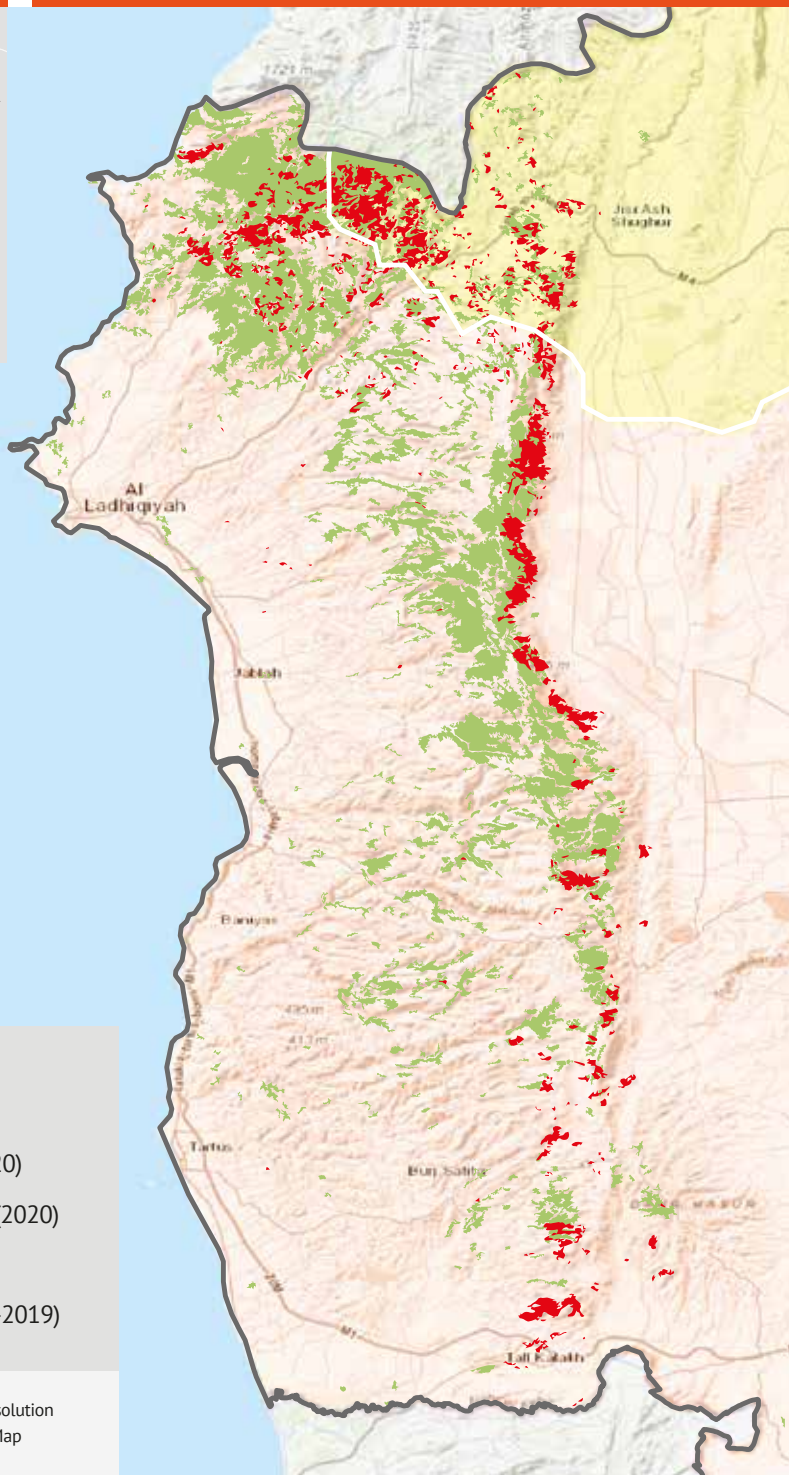
Deforestation
Syria's main forested areas are in the west of the country and have been severely affected throughout the last nine years. This is mainly caused by cutting down trees for firewood and charcoal production, forest fires, and the deliberate destruction by targeting armed groups hiding in the forest.

Forest cover loss in Syria

Peace. Are you in?

Syria

Western Syria



N

0 5 10 20 Km

Legend

- Syrian government (2020)
- Rebel-controlled areas (2020)
- Forest area (2010)
- Forest cover loss (2011-2019)

Data for analysis: Sentinel-2A, 20m resolution
Basemap source: World Topographic Map

Our analysis uses satellite imagery and machine learning combined with open-source resources to classify the land cover, with baseline data from before the conflict started in 2011. Then we looked at the loss of tree cover every year, which showed a drastic reduction in trees in the period 2012-2013, and ongoing forest loss continuing until 2019. In total we identified a 20.4% loss of tree cover in the period 2012-2019.

Loss of tree cover has direct and long-term impact on biodiversity and ecosystems. Forest loss and degradation has already led to the extinction of species and the damage of livelihoods of millions of people – who rely on forests for subsistence. Tree cover loss can also create soil erosion and landslide risks. Reforestation and recovery of these affected areas will therefore be crucial for environmental recovery and sustainable reconstruction for Syria's people and to combat climate crisis related risks.

Oil Pollution

Local concerns about ongoing pollution of ground and surface water, soil and air from a crumbling oil industry spurred research into a number of structural problems such as dumping of oil, wastewater and incidental problems suck pipeline breaks and seasonal flooding of oil filled rivers. Using satellite analysis and interviews with affected communities PAX documented ongoing oil spills from leaking refineries that polluted a 160km long river, flooded agricultural lands and impacted the local groundwater sources on which dozens of villages and towns depend. Nearby communities fear the impact of these spills on their health and livelihoods.

Furthermore, the widespread use of unsustainable coping strategies such as makeshift oil refining is posing a serious risk to civilians active in this informal oil industry, including many children working in toxic conditions to support their family. Tens-of-thousands of such refineries contribute to further environmental degradation from oil waste dumps and air pollution. International support for clean-up, remediation and sustainable use of natural resources is key for redevelopment of these areas, recovery of affected ecosystems and safe use of land and water sources by local communities.

Addressing environmental damage from the conflict, including the severely damaged oil industry, deforestation but also proper solid waste management, environmental regulation and repairing environmental infrastructure is a critical component of post-conflict reconstruction and environmental rehabilitation work in Syria. Access to clean water, removal of toxic waste and reforestation is crucial for rebuilding a healthy ecosystem for people to live in and rebuild their country.

More on PAX's Conflict & Environment work can be found at https://www.paxforpeace.nl/our-work/programmes/conflict-environment.

Solid waste burning near an oil field in north east Syria. , © Abdullah Mohammed

3. Colombia: Governance Vacuums, Illegal Forestry, and Land Grabbing

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Universidad Externado de Colombia

Carl Bruch
Environmental Law Institute

Miguel Londoño
Global Green Growth Institute

One of the biggest challenges for Colombia after signing the Peace Agreement is the institutional vacuum and lack of environmental governance in the territories most affected by the armed conflict. The 2016 Peace Agreement signed between the Colombian government and the FARC-EP guerrillas provided that the guerrillas would disarm and reintegrate into society. The Peace Agreement did not provide, however, the necessary environmental governance provisions that meet the needs of remote territories after the armed groups demobilize. Although the Agreement has some general environmental provisions, mainly related to environmental protection areas, it was not specific in terms of the environmental governance of the territories and natural resources.

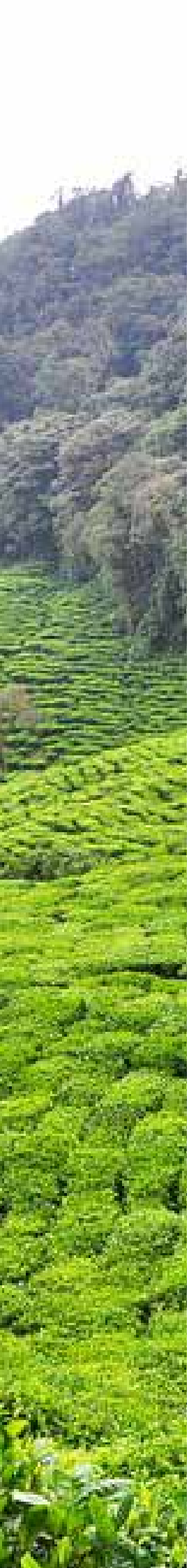
Unfortunately, four years after the signing of the Agreement, there is a power vacuum. The FARC no longer governs the territories it had controlled, and the Colombian government has not been able to effectively re-establish governance and security.

Into this governance vacuum, there has been an unprecedented escalation of illegal logging, land grabbing, and illegal gold mining, as well as continued cultivation of coca. For example, 31 of Colombia's 39 protected areas (79%) saw increased deforestation after the peace agreement. This translated into a 177% increase in the deforestation rate between the 3-year period (2013-2015) before the peace agreement and the three-year period following the peace agreement (2016-

© GGGI Colombia

2018). And in one year alone (from 2016 to 2017), there was a 4 percent increase in the conversion of protected area lands to growing coca crops, with additional lands grabbed for other purposes. Particularly in the regions formerly controlled by the FARC, armed groups, and people from outside the region have been systematically and illegally clearing land in national forest reserve areas and protected areas. Much of the deforestation and "colonizing" of designated forests is associated with people seeking land for cattle, oil palm, and other livelihood opportunities.

The lack of environmental governance in the most affected territories has had a significant impact on deforestation in the country. The government has not been able to control the situation for four key reasons. First, the regions are remote, so it is difficult for the state to effectively establish a presence, and there are still FARC dissidents who continue to exercise de facto control in the territory. Second, in order to strengthen rural development, the Peace Agreement included measures to formalize 7 million hectares of land, which increased expectations of land redistribution and titling, even in protected forest areas, generating incentives to grab land especially in the Amazon. Third, state actions have been aimed at fighting deforestation in a general way, and although institutional coordination between the different responsible state agencies has been strengthened, there are still no clear actions aimed specifically at addressing land grabbing as a driver of deforestation. Finally, a very important factor has to do with the "invisibility" of the actors responsible for this problem. The government has not identified who are the key actors behind these practices (such as politicians and figures in organized crime), as differentiated from the peasants who are actually carrying out deforestation actions. As such, even if peasants are occasionally arrested for deforestation and land grabbing, the underlying drivers (such as poverty) and enablers (such as regional politicians and armed groups) go unaddressed.



In the last few years, however, the national government has begun to promote strategies seeking to control deforestation and boost the forest economy in the country. With the support of ten international cooperation organizations and in coordination with regional environmental authorities, 13 departments of the country are using a community forestry model to improve the quality of life and local economy of forest inhabitants and make sustainable use of the goods and services in these ecosystems. This model seeks to develop actions so that communities can sustainably use the forest to improve their quality of life, conserve natural resources, and secure environmental rule of law in their territories.

In conclusion, the signing of the Peace Agreement did not mean the end of the conflict. On the contrary, it exposed and increased the social, economic, and environmental problems in the conflict-affected territories. Although this can be explained by multiple causes, it is clear that the concept of territorial peace that is incorporated in peace agreements must be linked to the concepts of governance, environmental rule of law, and environmental justice. In this manner, environmental issues must be conceived in terms of the interrelation between human beings and their natural surroundings in which they have constituted the territories they live--and the environmental issues must be seen as essential to the peace process. Thus, taking environmental issues into consideration in peacebuilding is necessary to address the structural causes that generate socio-environmental conflicts; doing so, though, can lay the foundation for a more stable and lasting peace.

For more information:

- https://www.dejusticia.org/column/el-invisible-acaparamiento-de-tierras/
- https://es.mongabay.com/2018/08/acaparamiento-de-tierras-colombia-estrategias-gobierno/
- https://www.tni.org/en/article/territorial-peace-and-land-grabbing-in-colombia
- https://doi.org/10.1038/s41598-020-61861-y
- https://www.minambiente.gov.co/index.php/noticias/4746-manejo-forestal-comunitario-aliado-para-el-control-de-la-deforestacion

4. Monitoring Agricultural Stress in Yemen

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Conflict and Environment Observatory (CEOBS)

Agriculture is the lifeblood of the Yemeni economy and its culture. However, our assessment of environmental change during Yemen's armed conflict reveals severe and widespread agricultural distress. Our analysis indicates these changes mostly occurred because of factors linked to conflict. In many cases, the impact of these factors has been amplified by historical policies, especially around water access, which have increased vulnerability.

Yemen is food insecure, and many Yemenis face famine conditions. Because of this it is important that urgent steps are taken to limit further losses to its agricultural sector. The COVID-19 pandemic is reducing humanitarian assistance to Yemen as healthcare comes under greater pressure, aid becomes harder to deliver, and donors face economic pressure at home. Protecting and restoring Yemen's agricultural sector in an economically, environmentally, and culturally sustainable way will be critical for increasing the resilience of Yemen's people.

When the security situation allows, agricultural recovery programmes must ensure that they are environmentally sustainable, and provide increased productivity, food security and secure livelihoods.

What we found

We used open-source datasets to identify agricultural areas in distress, and to investigate to what extent the conflict has been responsible for the deterioration. Multiple stressors were found to be impacting the viability of agriculture and undermining food security. Key conflict-related stressors include: direct attacks to farms and agricultural infrastructure, the economic blockade and war economy reducing access to water, agricultural inputs and markets, and the collapse of governance.

The picture is complex, with some stressors acting in concert, or at different times in different locations. Developing an understanding of the relationships between them required detailed analysis of datasets on population, fuel prices, water availability, climate, and agricultural pests.

Our analysis has revealed that by early 2020, 257,000 hectares of cropland were exhibiting signs of distress, approximately equivalent to the total cropland in Jordan or Lebanon. Particularly hard hit is the southern Tihamah (near Hodeidah), Jawf, the southern deltas (near Aden), the upper Hadhramaut valley, the northern highland plains (near Sana'a), and Marib.

Areas were classified as distressed if they had less biomass than would be expected, after excluding the influence of climatic factors such as rainfall and temperature. We did this by comparing their health for the period before the conflict (2009-13), with the period during the conflict (2014-19). The approach sought to isolate out the influence of human factors from climatic variability. The distress has led to a reduction in food security because of a loss of livelihoods, farm incomes and, in remote areas, food for subsistence.

Some of the stressors we identified are indirectly connected to the conflict, a result of the societal and economic conditions that the war has created. However, some were direct consequences of how the war has been fought. The conflict in Yemen has seen the deliberate targeting of agricultural infrastructure, in breach of international humanitarian law. Based on our analysis of the Armed Conflict Location and Event Data Project (ACLED) database, fighting – intentionally or unintentionally – has directly impacted the agricultural sector. In total we have identified more than 1,600 of these events; the year and approximate location of which are plotted in image below.

Many elements of agricultural infrastructure indispensable to the survival of communities have been damaged during the conflict. The distribution of conflict events changes over time. In general, targets in the early years of the conflict were in the central upland areas, whereas in recent years there has been an increase in the Tihamah and the north western uplands. This correlates with the shifting conflict lines.

Agricultural pests, like locusts, have flourished because of a combination of weakened governance, insecurity and higher than average rainfall. This summer East Africa suffered a desert locust crisis, resulting in 4.9 million people facing starvation. We tracked their movement, finding that the locust swarms originated in Yemen in August 2019, before migrating to Ethiopia, where their progeny moved to southeast Ethiopia (October), to Kenya and Somalia (December), then within Kenya, Ethiopia, northern Tanzania and northern Uganda (January-onwards). The next generation was expected to transit through South Sudan and potentially into Chad and West Africa.

The conflict conditions in Yemen prevented proper control measures, leading to an environmental and humanitarian crisis elsewhere. It is a remarkable example of the environmental dimensions of conflict reverberating across a continent, potentially destabilising areas thousands of kilometres away. As conditions are currently so favourable for locusts, the same pattern may happen again.

In the face of locusts, cumulative degradation, water stress and the COVID-19 related loss of humanitarian assistance the immediate outlook for food security in Yemen is bleak. In the longer term, more effective water management and targeted agricultural policies will be vital for the country's development in the face of an increasingly unpredictable climate.

Our research demonstrates that it is possible to remotely monitor the complex interactions of environmental, social, and economic factors during conflicts. However, because of the complexities and often local narratives involved, such work has its limits. Nevertheless, by drawing attention to both the degradation itself, and to the numerous stressors influencing it, it is hoped that we can contribute to improved responses that can ultimately help to limit harm and increase the resilience of communities.

Read more: https://ceobs.org/yemens-agriculture-in-distress
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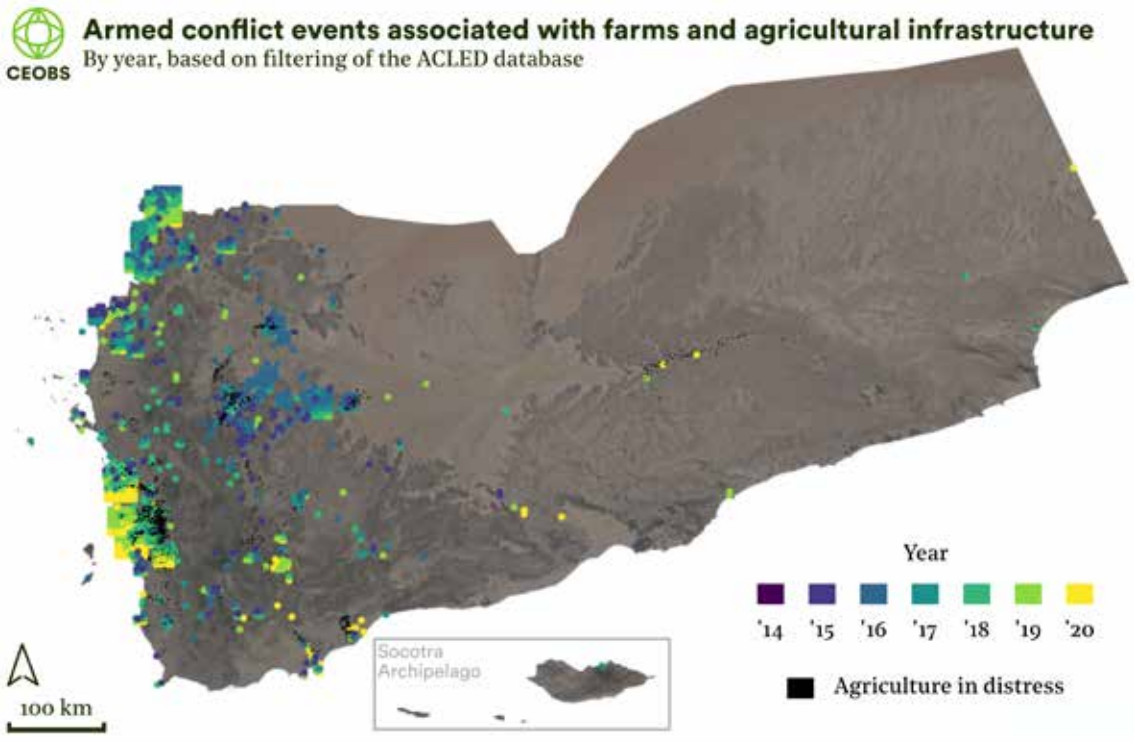


5. Toxic Industries in War-time Donbas

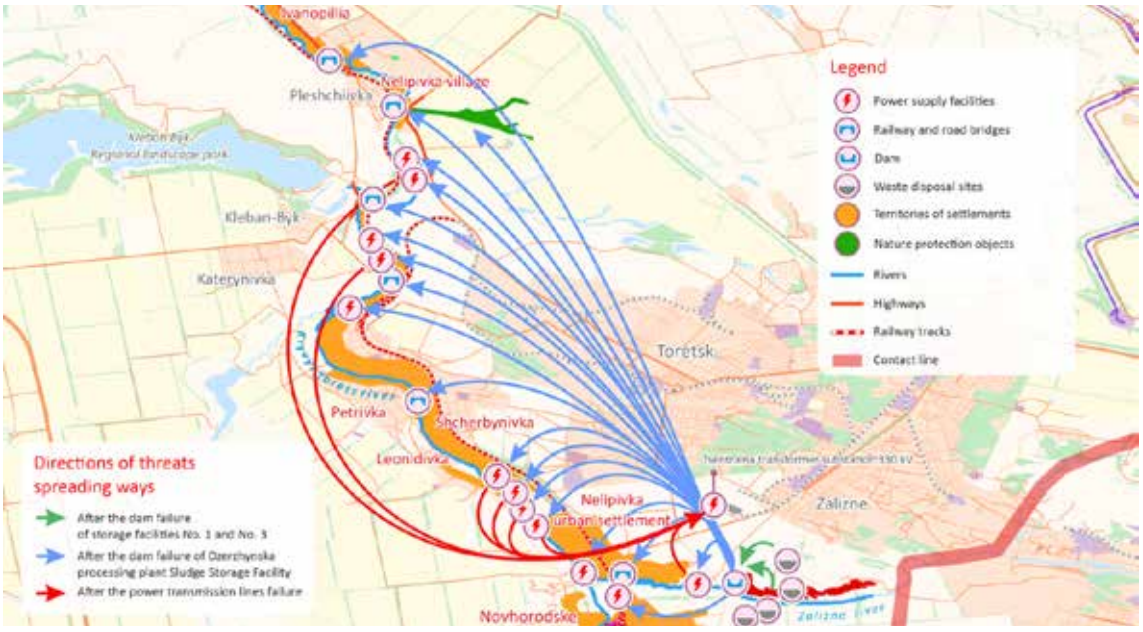
Nickolai Denisov
Zoï Environment Network

Iryna Nikolaieva, Dmytro Averin, Oleg Lystopad
Kyiv

Long before hostilities broke out in 2014, the coal-producing Donbas region was among the heaviest industrialised areas of imperial Russia, the former USSR and later independent Ukraine. By the beginning of the conflict the area was home to thousands of industrial facilities, including 130 heavy ones such as metal smelting or chemical production.

Heavy industry in the Donbas region is severely impacted by the conflict. Factors including the fighting itself, difficulties with the supply of raw materials, water, and energy, and severe logistical challenges combined to make the working environment utterly unsafe. Enterprises were shelled, and in times of heavy fighting, certain staff had to live on the premises.

Based on open source information, production at almost 250 enterprises was compromised in one way or another, and more than 80% of the compromised facilities have high or very high levels of potential environmental risk. Today many Donbas industries no longer work at full capacity or at all, yet hazardous facilities and materials remain. Thus, as long as arms are being fired and politics stays unsettled there are toxic risks.



With relatively high industrial safety and emergency response standards and a professional and dedicated workforce, luckily no environmental disaster has happened so far. Yet the documented cases of perforated chlorine pipelines, shelled dams containing industrial tailings, and overflowing manure storage ponds are a disaster waiting to happen.

Avdiivka Coke Plant is the biggest of its kind in Europe. It is located less than ten kilometres, within artillery shelling range, from the line of contact, on the side controlled by Ukraine. Since the beginning of active military action in 2014-2015, landmines have been placed in the area and the enterprise was continuously shelled. As Olexiï Bobyr, the plant's head of production told journalists during the 2019 conflict-environment press-tour in Donbas:

> "First you hear the shot, then after three seconds the shell arrives. What early warning system? Of course, none can help here. Or you hear a howitzer fire thirty kilometres away. Ba-bah! Well, there were a lot of shots then, who would know how to react. Suddenly you just hear this buzz over your head, and then it "arrives" at the plant. There were no small arms here: artillery shells, rockets, mines arrived. Four pieces or so did not explode - I took them out of the shop with my own hands so that workers would not be injured (our people are curious, they would take a hammer and a chisel... Disassemble, knock on it – it's interesting...) Then we called deminers. "

More than 300 shells landed in the plant premises, only one production unit was not hit. After a shell hit benzene tanks it took three days to put out the fire. Supply lines, including the plant's gas pipelines, were hit too. Twelve workers died, including two while working. With water, gas, and electricity supplies frequently cut off, the plant was forced to invest in alternative electricity supply lines via a safe zone.

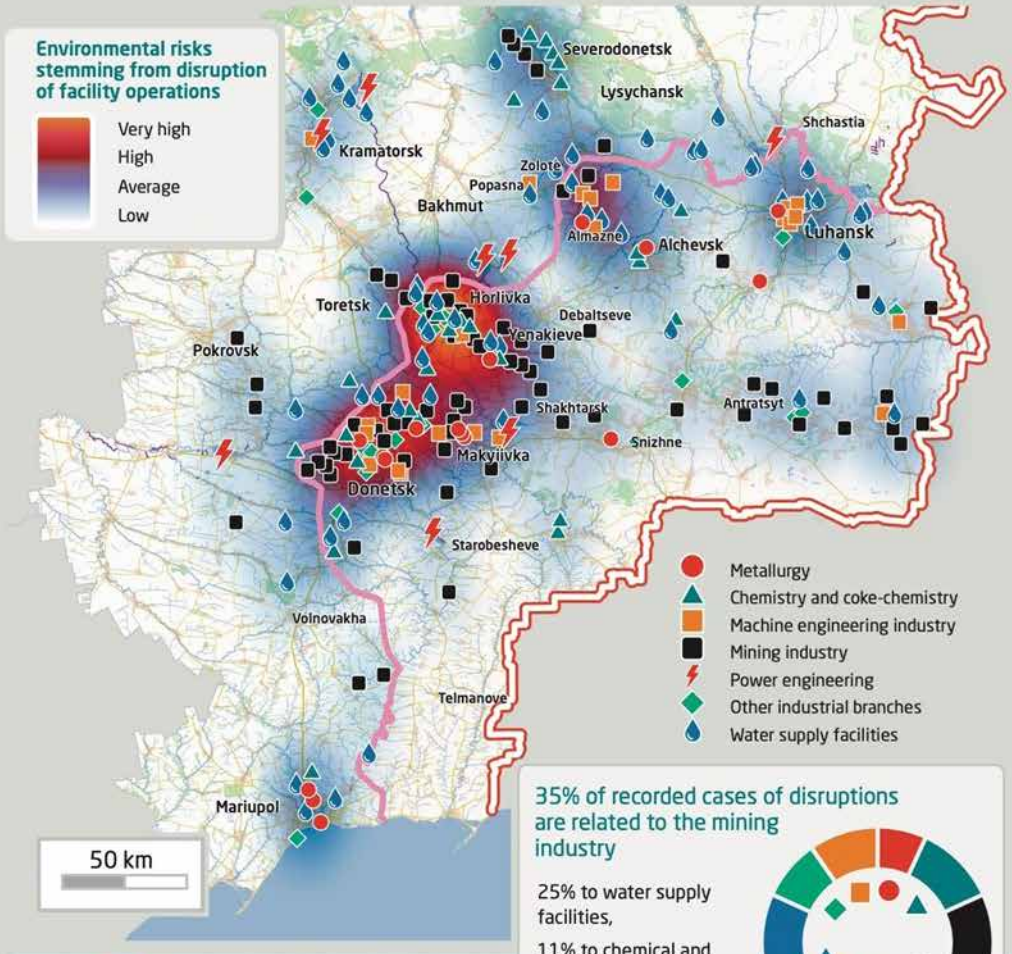
The enterprise is active today and operates several tailing storage facilities. One of them, no longer used but never cleaned up, contains more than 400,000 tonnes of highly toxic chemical waste. Shooting continues despite persistent political attempts to settle the conflict, while landmines prevent proper environmental monitoring. As highlighted in a recent study of several Donbas tailing dams, if something goes wrong the risk of a 'domino effect' can be dramatic, in the worst imaginable case reaching as far as the Sea of Azov.

Some areas during conflict can be considered a tinderbox, ready to spark and envelope their surroundings in flames. But others, including those in which heavy industry operates, are more like a gunpowder magazine, at risk of enormous compound social and environmental effects.

1

COMBAT IN INDUSTRIAL AREAS POSES HIGH RISK

Military activities in any industrial area create considerable environmental hazard. Deliberate and unintentional damage to industrial hardware, infrastructure, fuel storage facilities, raw materials or industrial waste pose significant risk for environmental disaster. Among the 247 enterprises at which operational activities were compromised by military activities, those which pose the greatest potential danger include: the Yasynivskyi, Avdiivskyi and Yenakiivskyi coke plants; the Yenakiivskyi, Alchevskyi and Donetskyi metallurgical plants; the Toretskyi ferroalloy plant; the chemical company "Concern Stirol"; the Luhanska, Vuhlehirska and Myronivska TPPs.

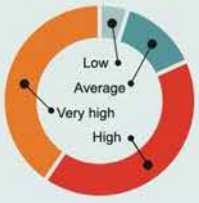


35% of recorded cases of disruptions are related to the mining industry

25% to water supply facilities,

11% to chemical and coke-chemical industry,

10% to machine engineering industry.



More than 80% of the facilities damaged during hostilities have high or very high environmental risk levels. The highest environmental risk zones are seen at the population agglomerations of Donetsk – Makiivka, Toretsk – Horlivka – Yenakieve, and in the city of Mariupol in the Donetsk oblast. In the Luhansk oblast, sites of highest risk include: Luhansk, Alchevsk and the population agglomeration of Almazne – Irmino – Zolote.

These materials have been prepared using Donbas Environment Information System (DEIS) data with additions

DEIS Donbas Environment Information System

ZOI

Ministry of Energy and Environmental Protection of Ukraine

OSCE Organization for Security and Co-operation in Europe Project Co-ordinator in Ukraine

6. Protecting Nature while Preventing Harm

Katie Harrison
Norwegian People's Aid

The Lao People's Democratic Republic (PDR) has the unenviable distinction of being the most heavily bombed country on earth. From 1964-1973, the U.S. dropped over 2 million tons of explosive ordnance on Lao PDR in one of the largest aerial bombardments in history. The widespread damage caused by the explosions killed and injured tens of thousands of people, destroyed entire villages, riddled the earth with bomb craters, and scorched countless acres of agricultural land and unique biodiverse ecosystems endemic to Lao PDR.

As a case study about the environmental impacts of the use of explosive weapons in armed conflict, Lao PDR presents a strong cautionary tale. The massive harm from explosive weapons at the time of their use and the scale of the still-present threat of UXO contamination are obvious arguments for prevention of environmental harm before the conduct of military intervention. It is also important in as the consideration of environmental harm caused during, and after, military operations are carried out.

The millions of UXO left to fester in the land, streams, riverbeds, paddy fields, jungles, and mountain tops of Lao PDR leach toxic chemicals into the soil and ground water slowly over time, as well as continuing to kill and injure people and wildlife. The means of finding and removing UXO can also cause additional environmental harm as a result of the methods required to safely locate and destroy UXO, from small submunitions up to large aircraft bombs.

International Mine Action Standards (IMAS) now contain an Environmental Management standard (7.13). However, IMAS standards must also be adapted to the local context to consider broader environmental issues, the methods of mine and UXO removal and destruction, and the daily running of mine action operations.

Lao PDR, often described as a country littered with UXO is also at risk from litter, primarily single-use plastics. Solid waste management impacts are particularly acute in Lao PDR due to poverty, low levels of socio-economic development, lack of infrastructure, public policy, and public awareness. Burning garbage is a ubiquitous and serious threat to human health and air quality.

In Lao PDR, the twin environmental threats of UXO and non-biodegradable waste, converge. Many accidents have been recorded when villagers burn waste and detonate hidden UXO in the process, causing injury or death.

Waste and recycling separation at NPA Sekong Camp, © Katie Harrison

In 2020 NPA and Zero Waste Laos conducted an environmental impact assessment of NPA Lao PDR's operations. The findings revealed that over a third of NPA staff members reporting burning garbage as a primary means of waste disposal; a clear lack of understanding of how to separate waste at source; a lack of understanding of, or options for, recycling collection; or a general sense of futility, as despite separating waste at source, all waste was then dumped together in illegal rubbish dumps nearby. While organic waste scraps were reported (and witnessed) to be fed to animals and pets, there was little reported knowledge, or evidence, of composting being carried out to reduce the amount of organic waste going to landfill sites unnecessarily.

These findings, while negative, are perhaps unsurprising. The majority of villages where NPA is operating (and recruiting its staff members, as a vital source of employment) are remote, and some of the poorest, most marginalised in the country, often as a direct result of UXO contamination.

As a result, NPA will aim to minimise waste generation, including requiring the use of reusable materials such as canvas bags, cutlery, cooking equipment, and food, water, and rubbish storage containers. We will also require NPA operational management and team leaders to locate options for recycling, including through intermediary and local 'middle-man' collectors, in the absence of commercial or state-run facilities. NPA will provide training for staff members on composting, waste separation, and the use of organic waste for pet and livestock consumption. Most importantly, we will put in place measures to prohibit the burning of garbage, hazardous materials, and illegal dumping.

This also provides impetus to update the National UXO Standards on Environmental Management. The National UXO Standards are applicable not only for NGO humanitarian mine action operators, but also commercial companies, and the Lao Army.

The goal of humanitarian mine action is the return of safe land for productive use for individuals and communities. This means land free from mine and UXO contamination, and any additional contamination caused by mine and UXO survey teams. While mine action is increasingly embracing a 'do-no-harm' approach to environmental management, NPA Lao PDR believes we must go further. We must strive to actively improve the environment in areas where we work, and in addition to the removal of mines and UXO, leave the land we hand back to communities in truly better condition than we found it.

e pickers in burning rubbish dump Pakxong Champasak Province © Katie Harrison

7. Mobilising Art for Water and Peace in the Senegal River

François Münger, Léna Salamé, Mara Tignino, Jean Willemin
Geneva Water Hub

As a vital resource for basic social needs and economic activities, water management has strong implications at the local level. Further, as a resource in motion flowing both at the surface and underground, water constitutes a physical link that sets the preconditions of social cohesion in a given territory. The watershed often constitutes the common denominator for cultural identity of riparian communities, and remains the landmark where societies evolve.

In Sahelian societies, community livelihoods and their interactions are organised around the river flood cycle. In order to explore cultural roots and intimate linkages that connect people to water, and increase awareness about local populations' challenges, the Geneva Water Hub partnered with the "Festival à Sahel Ouvert", held in Mboumba on the bank of the Senegal River in February 2020. As stressed by the artist Baaba Maal, originally from this Fulani region: "This river has always been a connector for the consolidation of peace and social cohesion for the riparian communities. This is the reason why my songs magnify water as a source of life and peace among people."

This transboundary watercourse is home to one of the most elaborate basin organisation models: the Senegal River Development Organisation (OMVS). The OMVS is the creation of visionary politicians who recognised the necessity to join efforts to secure the water-related needs of the populations in Guinea, Mali, Mauritania, and Senegal following severe droughts in the 70's and 80's. Furthermore, the Organisation demonstrated its capacities to use water as a driver of peace by successfully resolving a dispute between Mauritania and Senegal in 1989 while all other diplomatic channels were suspended between the two countries.

Today, the development agenda of the Senegal River is faced with serious challenges. The escalation of armed violence in the region calls for the prevention of damage to water resources. The protection of natural resources and water infrastructure are increasingly at the forefront of international initiatives.

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The impacts of climate change, population growth, and more recently, the COVID-19 outbreak, constitute a range of destabilizing factors that weaken trust in political institutions and the very foundation of social cohesion.

Traditional livelihoods are threatened by growing competition over natural resources. Local fishermen express their concerns as their activities are impacted by pollution, desertification, and the effect of dams' operations. As outlined by the philosopher Souleymane Bachir Diagne, "the fisherman's tragedy illustrates the structural problems inherited from our conception of development. It is necessary to build a new relationship with water and ecosystems if we are truly to talk about a sustainable development." Basin agencies have a major role to play in order to stem the spread of pockets of fragilities that fuel local conflicts and armed violence. They are expected to regulate water use and its preservation, as well as promote economic integration of local interests. This latter role has been an enduring challenge since major infrastructure, albeit succeeding in implementing regional economic plans, often fall short of encompassing local economic dynamics.

The OMVS plans on organising a strategic reflection to respond to these challenges involving local actors and regional experts. The Geneva Water Hub together with Globe, International Network of Basin Organizations, International Secretariat for Water, Milk Music, Pôle Eau Dakar and Waterpreneurs will collaborate in this project. It will mobilize philosophers, artists, and cultural actors in the fields of music, cinema, theatre, and photography, in order to guarantee a creative and engaging dialogue on the multidimensional relationship of humans with water.

The artworks produced in this context will convey local populations' visions and key messages in their exchange with OMVS leaders. They will also raise their voices to the 9th World Water Forum to be held in Dakar in 2021. They will value the cultural heritage of the river basin by strengthening the common identity woven around the flow of water. The actual meetings will be organised at confluence points in the basin, in natural spaces for cultural and economic transactions. These confluence reflection spaces aim at developing practical solutions to local water entrepreneurship challenges. A new approach to local economic integration and innovative projects will hence be developed and promoted in response to issues raised during the discussions.

Conclusion

In nearly half a century since the first United Nations Conference on the Human Environment in Stockholm, the need to prevent, address and mitigate environmental harm is more urgent than ever. This urgency, and the acceptance that environmental change has the potential to undermine societies and development, requires that we reconsider the basis for national and human security. A healthy environment is elementary for the protection of civilians and a prerequisite for lasting security.

In the last decade, understanding of the environmental dimensions of armed conflicts has dramatically improved and is increasingly addressed in the international policy agenda. The drivers and consequences of harm are better understood through growing datasets and monitoring opportunities; environmental harms, incidents and trends are more visible; states, international organisations and civil society are more cognisant of the linkages and the need for action, and; a normative legal framework to enhance protection throughout the cycle of conflicts is emerging. Growing awareness of environmental impacts from military operations, be it in the targeting decisions and risks assessments or the environmental footprint, should result in further prevention, mitigation, and minimization of environmental damage. Prioritising environmental objectives in peace processes can create pathways for effective conflict transformation. While post-conflict environmental recovery can incorporate nature-based solutions, contributing to sustainability goals.

Without a coherent international agenda on the Environment, Peace and Security, already fragile states will face a more uncertain future. Conflicts will continue to wreak unacceptable levels of harm, accelerating environmental degradation and undermining human development and ecosystems. And by failing to develop and apply the policies that would help centre the environment in conflict transformation, we make a return to violence more likely.

A new Environment, Peace and Security agenda is urgently needed to ensure attention for the environment in the global peace and security discourse, and to encourage transformative policymaking. Components of this agenda must include:

- **A recognition of the intrinsic relationship between the environment, peace and security, and the critical role that the environment plays throughout the cycle of conflict.**
- **Acknowledgement of the inextricable link between the protection of the environment and the protection of civilians.**
- **A commitment to enhancing, adopting, implementing, and promoting compliance and accountability with the legal framework protecting the environment in relation to armed conflicts.**

- **Effective and sustained measures to mainstream the environment in peace and security discourses, policymaking, peacebuilding, and recovery.**
- **Support for the environmental data architecture necessary to inform effective decision making.**
- **Engagement with local authorities, affected communities, local civil society groups and experts to strengthen an inclusive process for health and environmental risk assessments and remediation work in post-conflict settings.**

It remains an imperative goal to defend and improve the environment for present and future generations. The international community now faces a choice. Utilise these tools and this engagement to reduce harm to people and ecosystems already made vulnerable by the climate emergency, accelerating biodiversity loss and pollution, or continue with business as usual. A new agenda for the Environment, Peace and Security is an opportunity to shift from agreements to action.

Witnessing the Environmental Impacts of War
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