

PERSPECTIVES

ISSUE NO 24

CONFLICT POLLUTION AND THE TOXIC REMNANTS OF WAR: A GLOBAL PROBLEM THAT RECEIVES TOO LITTLE ATTENTION

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Severe pollution incidents have provided some of the most visually arresting images of recent armed conflicts. Oil fires and spills, bomb – damaged and looted industrial facilities, abandoned military material and munitions, rubble and demolition waste – all are associated with contemporary conflicts, and all can threaten ecosystems and human health. But these obvious, and often serious, sources of pollution rarely tell the whole story. The relationship between armed conflict and pollution – or what we view as the toxic remnants of war – can be complex, and its legacy can last for decades after conflicts end. While it is a problem that has received increasing attention in recent years, too little is currently done to minimize the generation of pollutants in conflict and military activities, and to examine and address their impact on human health and the environment.

How and where wars are fought matters

Across the oil producing regions of Syria and Iraq, conflict-affected communities desperate for income have resorted to refining and selling crude oil¹. Their work is clearly visible from satellite images, dark stains across the desert, comprised of primitive boilers and collection trenches, heated by burning oil. Much of the work is undertaken by children, who are exposed daily to the smoke and fumes from the artisanal refineries. The plumes spread across communities and their fields; the waste into the soil. This hazardous and polluting coping strategy is a result of the population's demand for oil products for fuel and heating, and also serves to help finance and power Islamic State's activities and those of other

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¹ PAX (2016) Scorched earth and charred lives: human health and environmental risks of civilian-operated makeshift oil refineries in Syria: <http://www.trwn.org/report-scorched-earth-and-scarred-lives/>



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rebel groups. But it is also a result of the collapse of the local economy, brought about by the long-running conflict, and the tactical decision by parties to the conflict to target and destroy formal oil facilities.

The health and environmental legacy of the artisanal refineries has yet to be studied in detail, and has been overshadowed, both literally and figuratively, by the burning oil wells of northern Iraq². Wells and oil infrastructure were targeted and set alight by Islamic State during their retreat from the Qayyarah area near Mosul in mid-2016³. Insecurity, the presence of improvised explosive devices and the complexity of extinguishing the blazes meant that several fires continued to burn well into 2017, with new attacks reported in a more southerly oil field in March. The plumes from the fires have spread across a wide area of Iraq and at present their environmental and health impact remains unclear. For a time last year, the oil fire plumes mingled with a white fog of sulphur after Islamic State also set fire to stocks at the Mishraq Sulphur Plant, leading to deaths and casualties⁴.

These examples demonstrate that conflict pollution can be both a direct result of how and where wars are fought, and also that it can be caused or worsened by the economic and societal conditions associated with armed conflicts. We view these as direct and indirect toxic remnants of war⁵. It's also the case that tackling pollution sources and assessing their impact in conflict and post-conflict settings is often far more complex than comparable cases in peacetime. Indeed, institutional collapse, and the low priority afforded to the environment following conflicts, often contribute to many incidents never being properly addressed.

War is a dirty business

Conflicts with a legacy of pollution are not a new phenomenon. Areas of France and Belgium are still affected by heavy metal contamination from the intensive use of conventional munitions in World War One⁶. Meanwhile the legacy of the dumping at sea of surplus conventional and chemical munitions from the two world wars, a practice that which continued until the late 1970s, continues to interfere with fishing and marine renewable energy generation. Such marine remnants of war affect the Baltic, north Atlantic and many small island states in the Pacific.

Burning oil wells around Qayyarah blackened the skies and caused localised pollution risks for local communities. The site was visited by PAX in January 2017, as part of its Conflict and Environment program in Iraq.

- 2 TRW Project (2016) The environmental consequences of Iraq's oil fires are going unrecorded: <http://www.trwn.org/blog-the-environmental-consequences-of-iraqs-oil-fires-are-going-unrecorded>
- 3 UNEP/OCHA Joint Environment Unit (2016) A rapid overview of Environmental and Health Risks Related to Chemical Hazards in the Mosul Humanitarian Response: https://www.humanitarianresponse.info/system/files/documents/files/mosul_env_health_hazards_report_final_8nov.pdf
- 4 *Burning sulfur near Mosul sends hundreds to hospital, U.S. troops don masks*, Reuters, 22 October 2016: <http://www.reuters.com/article/us-mideast-crisis-iraq-chemicals-idUSKCN12M08G?il=0>
- 5 For an overview of different examples of toxic remnants of war see: <http://www.trwn.org/trw-sources>
- 6 TRW Project (2013) Assessing the toxic legacy of First World War battlefields: <http://www.toxicremnantsofwar.info/assessing-the-toxic-legacy-of-first-world-war-battlefields>



It was the Viet Nam War that first helped raise international awareness of the increasingly toxic legacy of industrialized warfare. The widespread use of defoliants contaminated with the persistent dioxin TCDD, together with other environmentally destructive practices, coincided with, and helped energize, the birth of the modern environmental movement. This led to the first meaningful effort to enhance the protection of the environment in times of war⁷. A positive step, but the protections developed in the 1970s have subsequently proved insufficient for the task; while the legacy of dioxin contamination on human health in Viet Nam has affected multiple generations and continues to this day.

From the burning oil fields and spills of the 1991 Gulf War⁸, to the deliberate bombing of The Former Yugoslavia's petrochemical facilities, and the destruction, abandonment and looting of Iraq's industrial and nuclear sites, warfare in industrialized or industrializing countries has gone hand in hand with serious pollution incidents. In many cases, states affected by insecurity and armed conflict have pre-existing problems with pollution, which conflict serves to worsen or exacerbate, be they inadequate waste management, limited capacity for governmental monitoring and oversight, or weak institutions and regulatory frameworks. One current conflict where these issues are particularly acute is that in Ukraine's Donbas region, where the use of heavy weapons in what is a highly industrialized area with a legacy of serious pollution is threatening to trigger a serious environmental emergency⁹.

Pollution associated with conflicts can also have consequences for countries neighbouring conflict zones. Chemical contamination of rivers or the marine environment are obvious examples, less so the environmental impact of largescale population displacements, which can place refugee-hosting nations under considerable environmental pressure if poorly managed. In this regard it was unsurprising that the environmental consequences of human displacement featured so prominently in the United Nations Environment Assembly -2 resolution '*Protection of the environment in areas affected by armed conflict*'. The collapse of governmental oversight and the loss of control over borders stemming from conflicts can also encourage the illegal transit and dumping of hazardous wastes.

Since 1999, conflict pollution and the toxic remnants of war have been a persistent feature of UN Environment's post-conflict environmental assessments: depleted uranium weapons in the Balkans; abandoned military materiel in Afghanistan; hazardous industrial sites in Iraq; to waste, rubble and munitions constituents in Gaza and Lebanon and abandoned industry in Sierra Leone¹⁰. Yet while much of our focus remains on the pollution caused during conflicts and in their wake, this can help conceal the environmental impact of the preparations for war.

The defence industry has been responsible for generating significant levels of pollution in its production of weapons, vehicles and equipment. While this reached a nadir during the Cold War, when production was at its height and environmental standards were weak, today defence exemptions in chemicals legislation remain commonplace. For example under the Minamata Convention on Mercury and the European Union's Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) framework.

7 For a history of efforts to enhance legal protection for the environment in relation to armed conflict, see: Amb. Marie G. Jacobsson (2016) Working to protect the environment in armed conflict: <https://medium.com/@UNEP/working-to-protect-the-environment-in-armed-conflict-ce9aff1aa479#.j78sm10r1>

8 TRW Project (2016) What the environmental legacy of the Gulf War should teach us: <http://www.trwn.org/blog-what-the-environmental-legacy-of-the-gulf-war-should-teach-us>

9 OCHA (2017) Humanitarian Bulletin Ukraine (Jan-Feb 2017): https://www.humanitarianresponse.info/system/files/documents/files/ukraine_humanitarian_bulletin_issue_16_jan_feb_2017_en.pdf

10 UNEP's post-conflict environmental assessments are available at: [http://web.unep.org/disastersandconflicts/publication?f\[0\]=field_thematic_sector%3APost-Conflict%20Environmental%20Assessment](http://web.unep.org/disastersandconflicts/publication?f[0]=field_thematic_sector%3APost-Conflict%20Environmental%20Assessment)



Significant pollution can also be generated during testing and training at domestic and overseas military facilities, where a “flexible” approach to domestic environmental laws has often been required to allow activities to take place.

Sustaining military activities in conflict zones can also generate pollution, most notoriously through poor waste management practices such as the use of open air burn pits for waste disposal. Opposition to these practices has tended to focus on the health risks they pose to service personnel, with far less attention on the communities living in proximity to such sites. While deployments in active conflicts are more likely to allow lower environmental standards as part of the calculus of mission success, peacekeeping missions may also have a significant “footprint”, although there have been increasing efforts to minimize poor practices in recent years¹¹.

Changing how we think about conflict pollution

As noted above, conflict pollution is not a new phenomenon. Historically, the diverse sources of pollution associated with conflicts and military activities have been dealt with in isolation, if at all. This has encouraged a fragmentation of responses, which conceals the fact that, irrespective of pollution source, there are commonalities that apply to the assessment and management of pollutants caused or mediated by armed conflicts. This supports the idea that a common approach should be explored. One example could be that taken by humanitarian mine action initiatives towards anti-personnel land mines, cluster munitions and other forms of unexploded ordnance. One could view these as equivalent to different forms of pollution, but there are common approaches to addressing the threats that these weapons – the explosive remnants of war – pose to humans; they often occur together in affected areas and, as a result, none tends to be dealt with in isolation.

Similarly, for pollution as a whole, while specific standards and approaches vary between states and regions, together legislative approaches seek to identify hazardous substances, regulate their use, minimize their release, assess and remedy incidents and examine and address their health and environmental impact. It has been this approach that has underpinned the recent emergence of the toxic remnants of war concept. So, while wartime industrial accidents, munitions residues, institutional collapse, waste and rubble may represent very different sources of pollution, a normative framework that seeks to enhance the protection of human and environmental health from their impact could nevertheless be founded on these common protective principles.

The threat that toxic remnants of war pose to human health has recently been noted by the United Nations Special Rapporteur on human rights and toxics, who observed that globally, they inflict pain and suffering on communities long after conflicts have concluded. He argued in favour of more effective monitoring and identification systems for conflict pollution and for governments to: “...provide an effective remedy for hazardous remnants of conflict and other military activities, including funding for full remediation, comprehensive medical treatment, and compensation for individuals experiencing the effects of exposure to these materials¹².”

11 See UNEP’s work on “Greening the Blue Helmets”: <http://web.unep.org/disastersandconflicts/what-we-do/preparedness-response/greening-blue-helmets>

12 UNHRC (2016) A/HRC/33/41, Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes: http://ap.ohchr.org/documents/dpage_e.aspx?si=A/HRC/33/41



Post-conflict remediation

In what may prove to be a far-reaching development, the International Law Commission, which is tasked by the UN General Assembly with the progressive development of international law, last year adopted a draft principle on the “toxic and hazardous remnants of war”¹³. The Commission has been undertaking a multi-year review of the state of legal protection for the environment before, during and after conflict. In doing so it has been synthesizing elements of international humanitarian, environmental and human rights law, as well as studying the practice and custom of states and international organizations. The draft principle calls on parties to conflicts to remove or render harmless toxic and hazardous remnants of war under their jurisdiction or control, and which are causing or risk causing damage to the environment. It also calls for them to reach agreement between themselves and with third parties on the provision of technical and material assistance to achieve this goal. The Commission also proposed principles on remnants of war at sea, on post-conflict environmental assessments and remedial measures, on data sharing, and on agreements between states over overseas military bases. If a mechanism could be developed to operationalize these principles, these too could also eventually contribute to efforts to minimize and address conflict and military pollution.



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The cost and complexity of addressing toxic remnants of war, particularly in insecure or highly politicized settings, means that successful remediation programmes tend to be the exception rather than the norm. One case that could have wider ramifications is that of the remediation of dioxin from the former US airbase at Da Nang in Viet Nam. During the war, the base became heavily polluted by spills and dumping of the defoliant Agent Orange. After long running pressure from US civil society and the Vietnamese government, and an environmental assessment that revealed that dioxin was spreading from the former airbase into the food chain and into the breast milk of local mothers, the US eventually agreed to fund decontamination work. While the US has not accepted liability for the pollution, USAID has funded a major programme to treat soil contamination at the site¹⁴. This is a positive step but Da Nang is just one of many such dioxin hotspots, and tackling these sites alone does not deal with the wider health legacy of dioxin exposure in Viet Nam.

Lakes of solidified oil tar near an extinguished oil well in Qayyarah. Humanitarian aid organisations have called for the cleanup and remediation of environmental hotspots around the oilfields and refineries, and for the subsequent monitoring of water sources and soil.

13 TRW Project (2016) States back further progress on conflict and environment in UN legal debate: <http://www.trwn.org/states-support-further-legal-work-on-environmental-protection-in-conflict/>

14 USAID (2016) Environmental remediation of dioxin contamination at Danang airport project: <https://www.usaid.gov/vietnam/environmental-remediation-dioxin-contamination-danang-airport-project-frequently-asked-questions>



Military pollution outside conflict

Because the peacetime activities of militaries and the defence industry take place within pre-existing regulatory frameworks, there has been increasing pressure to reduce pollution and the use of toxics in recent years. The prevalence of harmful practices during the last century left a legacy of health and environmental concerns and vast liabilities for remediation, and this too has encouraged greater attention on the impact of defence activities. The scale of the problem is particularly evident in the US, where numerous former production and testing facilities are now Superfund sites. The scale of the liabilities, and tighter domestic environmental regulation, has encouraged the US military to clean up its activities, for example through the screening of new compounds for munitions and with programmes that seek to identify emerging contaminants of concern¹⁵.

However, harmful practices still continue. One example is the open burning of surplus explosives and propellants. Globally, the vast majority of munitions are never used in conflict, with most requiring disposal at the end of their life. For years open burning and open disposal - OB/OD - has been the cheapest option but one with a significant environmental footprint from air pollution and the contamination of soils and water sources. It is now banned by many countries unless no other options are available. Grassroots activists in the US have recently led a successful campaign to challenge the continuing use of OB/OD. The Ceasefire Campaign has drawn attention to sites across the country and worked closely with affected communities¹⁶. Cleaner, greener methods of disposal are widely available and can do much to help protect human health and the environment.

Reducing pollution during conflicts

While there are some signs of progress on reducing pollution before conflict, and growing awareness of the need to tackle it afterwards, minimizing polluting incidents during conflicts remains challenging. International humanitarian law's provisions for environmental protection are widely viewed as weak, with the thresholds for what constitute unacceptable environmental harm set unrealistically high. While customary law urges militaries to take all precautions in attack, such considerations are weighed against military success. So, while bombing an oil facility could cause serious environmental harm, it could be argued by lawyers that the military advantage gained from its destruction would outweigh such concerns. Weak law does little to encourage effective implementation, and this is further discouraged by the absence of any accountability mechanism.

Some governments have sought to protect the environment through pre-conflict measures. Kuwait took steps to protect oil facilities and ensure emergency clean-up capacity was in place prior to the invasion of Iraq in 2003. This built on the experience of the 1991 Gulf War, from which remediation projects are anticipated to continue until at least 2020. At times, individual installations have taken urgent steps to reduce civilian and environmental harm. Staff at the Pancevo petrochemical complex in Serbia worked for weeks to reduce their stocks of ammonia in the face of repeated North Atlantic Treaty Organization (NATO) bombings. These examples are the exception, however, and in light of the current conduct of militaries and armed groups, the best protection may be greater scrutiny of conflicts and the more effective resourcing of emergency response teams.

15 TRW Project (2014) Screening of new military materials for toxicity and environmental harm: <http://www.toxicremnantsofwar.info/screening-of-new-military-materials-for-toxicity-and-environmental-harm/>

16 More information on the objectives of the Ceasefire Campaign is available at: <http://cswab.org/resources/cease-fire-campaign/>



Strengthening responses to conflict pollution

Social media, smartphones and improved access to satellite imagery are changing the way conflicts are documented. The ongoing conflicts in Syria, Iraq and Ukraine have seen open source intelligence used to document war crimes, battle damage, human rights abuses and, increasingly, the sources of acute and chronic pollution hazards. Collaborations between non-governmental organizations (NGOs) and international organizations are making the early identification of serious pollution risks and polluters a reality¹⁷. This is a significant advance and one that should be encouraged but this needs to be matched with the capacity to swiftly verify data on the ground, as well as the proper resourcing of international mechanisms – such as the UN Environment/Office for the Coordination of Humanitarian Affairs Joint Environment Unit – that can help facilitate rapid environmental and public health assistance.

While the most serious pollution threats may be readily identifiable and of sufficient concern to mobilize an international response, these often form only a small part of the overall picture. Environmental emergencies can capture the headlines but it is the wholesale collapse of environmental governance and public health systems in conflict-affected states that typically causes the most lasting and complex problems. Tackling this requires a far more comprehensive and determined effort to mainstream the environment in post-conflict reconstruction and institution building than currently exists¹⁸. It will mean ongoing and sustainable support to rebuild the capacity of post-conflict states to assess and monitor pollution threats; for the full implementation of chemical conventions; as well as for the governance mechanisms that can foster and protect environmental human rights¹⁹. Where peace can be sustained, the post-conflict period can also provide the space for efforts to build back greener. Supporting the deployment of less-polluting technologies can reduce emissions, improve efficiency and help reboot overreliance on heavily polluting industries.

Documenting the public health impacts of pollution is challenging in peacetime. In conflict and post-conflict settings it is more challenging still. Environmental data collection is often limited and the results may be subject to politicization. Health registries may be disrupted or absent, and there is an understandable focus on treating acute health problems rather than chronic illness. Priority areas for improving the identification of those harmed by toxic remnants of war include increasing the number of actors recording environmental data, the deployment of lower cost sampling technologies, and the development and adoption of robust methodologies for biomonitoring and epidemiological studies that are appropriate for post-conflict settings²⁰.

Conclusion

Pollution generated in peacetime tends to receive far greater attention than that resulting from armed conflicts. But by taking a lifecycle approach, which considers pollution generated in the preparation for war, and the often decades-long legacy of disruption to health systems and environmental governance that follow armed conflicts, it becomes clear that military and conflict pollution is both a global problem and one whose effects extend well beyond the duration of hostilities.

17 Zwijnenburg, W (2016) Environmental damage as a weapon of war? Open source industrial risk analysis of the Mosul battle: <https://www.bellingcat.com/news/mena/2016/10/25/environmental-damage-weapon-war-open-source-industrial-risk-analysis-mosul-battle/>

18 TRW Project (2017) Mainstreaming the environment in peace and security: <http://www.trwn.org/blog-mainstreaming-the-environment-in-peace-and-security/>

19 TRW Project (2016) A healthy environment must be a human right – especially in armed conflict: <http://www.trwn.org/blog-a-healthy-environment-must-be-a-human-right-especially-in-armed-conflict/>

20 Weir, D (2015) Civilian protection, environmental pollution and conflict – a role for the public health community. *Medicine, Conflict and Survival*, DOI:10.1080/13623699.2015.1020103



While recognition of the threat that toxic remnants of war pose to communities and ecosystems lags behind that of explosive remnants of war, the problem is increasingly being recognized internationally, thanks in part to the growing number of conflicts that take place in areas with industrial hazards or underlying pollution issues. From Iraq and Syria, to Ukraine, Libya and South Sudan, conflicts and insecurity are creating new pollution hazards and exacerbating pre-existing problems. This is a trend that shows no sign of abating. It is therefore imperative that the international community does more to ensure the rapid identification of hazards and to increase the quantity and quality of environmental data recorded during and after conflicts. It is also vital that more is done to identify and assist affected communities and that the environment receives greater prioritization in post-conflict response and recovery.

UN Environment can, and must, help contribute to these objectives. During conflicts, monitoring by civil society can play an important role in identifying and publicizing pollution threats. UN Environment should help to facilitate the engagement of local and international non-governmental organizations (NGOs) in this field through the development of skills and knowledge sharing and perhaps a common code of practice. Following conflicts, environmental assessments should have a stronger focus on public health outcomes linked to environmental harm. This may require closer cooperation between UN health, environment and humanitarian agencies, non-governmental organizations (NGOs) and national authorities, and should ensure that systems are put in place that allow health outcomes that may be linked to environmental exposures to be followed up over time. At present, the longer term health consequences of conflict pollution often go unrecorded, yet this is a crucial metric for efforts to understand and tackle the environmental impact of conflict.

However, as with pollution in peacetime, dealing with it at source remains the most cost effective solution. For conflict pollution, this means finally remedying the poor state of protection for the environment in relation to armed conflicts, and the inadequate systems of response. The UNEA-2 resolution, and the views of governments on the work of the International Law Commission, has demonstrated that there is an appetite for progress on conflict and the environment, but achieving lasting change will require a far greater commitment from states and civil society than presently exists.

Doug Weir has researched the toxic legacy of armed conflict and military activities since 2005. He currently manages the Toxic Remnants of War Project, which was established in 2012 to document the humanitarian cost of wartime environmental pollution. Together with its partners, it seeks to monitor active conflicts for environmentally damaging incidents and to research methodologies for improving data collection on environmental risks. The project is a founding member of the Toxic Remnants of War Network, a global coalition of NGOs advocating for a greater standard of environmental and humanitarian protection before, during and after conflict. The Project and Network are deeply engaged with the developing international initiative to strengthen the protection of the environment in relation to armed conflicts - or PERAC. Doug blogs on conflict and the environment for The Ecologist, New Internationalist and other platforms and an eternity ago studied Geology and Journalism at Manchester and Sheffield universities.

You can follow the Project and Network on [@detoxconflict](#) and [@TRWNetwork](#) or at www.toxicremnantsofwar.info and www.trwn.org.

