

The Environmental Consequences of the Use of Armed Drones

It is suspected that a small drone carrying a thermite grenade may have caused a massive arms depot blast near Balakliya, Ukraine in March 2017. The 350 hectare site near Kharkiv is around 100km from the frontline of the conflict in the eastern Donbas area. 20,000 people were evacuated and the blast is likely to have left a significant environmental footprint of heavy metals and energetic materials.

by Doug Weir and Elizabeth Minor, Originally published on [Toxic Remnants of War Blog](#)

To date, debate over the implications of the growing use of armed drones has focused on human rights, on the expansion of the use of force into new contexts, and on the imbalances created by the newfound ability to project violence at a distance. Reaching Critical Will invited Doug Weir and Elizabeth Minor to consider the environmental dimensions of the use of drone warfare for a recent publication '[The humanitarian impact of drones](#)'. They found the literature to be largely absent of considerations over the environmental and derived humanitarian impacts of drone operations, and so this blog, which is excerpted from the report, should be viewed as a starting point for efforts to assess the environmental consequences of the use of armed drones.

In armed conflict, and its aftermath, legal protection for the environment is weak, and systems for accountability and environmental remediation are largely absent. Those protections that do exist have been most clearly articulated in relation to massive levels of environmental harm. They primarily focus on the "natural environment"—without

articulating the linkages between environmental quality and the enjoyment of fundamental human rights. However, the risks of the generation of toxic remnants of war—conflict pollution that threatens human and ecosystem health—should be an important consideration in taking steps and measures to progressively limit harm in the use of force.

During the last decade, there has been a renewed effort to clarify and codify the relationship between environmental obligations stemming from international humanitarian law (IHL), international environmental law, and international human rights law, before, during, and after armed conflicts. The topic is currently under consideration by the [International Law Commission](#), and states have expressed their [growing concern](#) over the environmental and derived humanitarian consequences of armed conflict at the UN Environment Assembly.

Obligations to address the environmental legacy of pollution from armed conflicts and military activities have been [proposed](#) by the International Law Commission, and have recently been articulated in the [Treaty on the Prohibition of Nuclear Weapons](#), adopted in July 2017. These and other initiatives could support the advancement of both law and practice with respect to addressing toxic remnants of war.

The expansion of the use of armed drones by states to conduct airstrikes both within and outside of armed conflict has coincided with this increased interest in enhancing the protection of the environment in relation to armed conflicts. However, very little research has been undertaken into any possible relationship between the use of armed drones and environmental harm. Whilst not arguing that the environmental impact of armed drones is a central component of the harms that they cause, this short perspective proposes that air strikes conducted from drones could have environmental implications for communities, and that these should be considered in any discussions about the further regulation of

drones. In addressing the problematic aspects or potentials of armed drones as a set of technologies, and current trajectories in their use, states should at least consider that:

- The use of explosive weapons has the capacity to generate toxic remnants. One key concern surrounding armed drones is that these technologies have facilitated the expansion of the types of contexts in which states have been willing to use explosive force deployed from aircraft. If such trajectories are permitted to continue, potential environmental harms risk being seen in a greater variety of contexts;
- The legal standards of armed conflict have been applied in these particular uses of force, though these standards have been widely argued to be the inappropriate framework. With the low standards of environmental protection associated with armed conflict, this could also present risks in terms of greater environmental harm from the use of force; and
- Given the low standards of environmental protection in armed conflict, it should be investigated whether drone technology through its unique characteristics could help facilitate the striking of environmentally risky targets during armed conflicts, and contribute to harmful practices in this way.

Given the lack of research in this area, this blog does not propose definitive conclusions on these points. Rather, it proposes that these are areas where there may be questions and concerns that states and others should be encouraged to consider, as part of any discussion on the broader picture of harm caused by armed drones.

Environmental impacts from the use of explosive weapons

Airstrikes from armed drones typically use [explosive weapons](#).

The use of explosive weapons can produce pollutants that pose risks to human health following their initial impacts, particularly when these weapons are used in populated areas. These toxic remnants—the effects of which are not well documented—may derive from the constituents of munitions[1] or from the destruction of buildings and damage to infrastructure, such as power, water, and sanitation facilities. Whilst potential toxic impacts will be greatest where the use of explosive weapons in populated areas has been widespread and sustained,[2] even limited use (such as individual air strikes) can bring risks to health in communities. As such, the environmental impacts of explosive force are a relevant concern in the context of airstrikes conducted using drones.

Several widely used munitions that states have fired from drones present toxicity concerns, such as Hellfire missiles and GBU-12 and GBU-38 bombs. These contain conventional explosive fills that utilise TNT and RDX. Both explosives are mobile in the environment, meaning that, for example, they can spread from soils into groundwater, and are toxic. The metals dispersed from these munitions are environmentally persistent. Where use is intense or sustained, evidence suggests that these can reach sufficient levels to pose a threat to civilian health.[3] There may also be specific concerns from novel materials that are being used in munitions deployed from drone platforms. For example, Dense Inert Metal Explosive (DIME) munitions, the long-term health impacts of which are unconfirmed, have [reportedly](#) been deployed from drones. A lack of transparency over the deployment of advanced weapons by drones limits efforts to study and assess their potential health and environmental risks from a perspective of limiting harm.

Challenging boundaries in the use of force

The specific capabilities offered by certain drones have been used by some states to facilitate an expansion in the range of

contexts in which they use explosive force. These states have used drones in a way that pushes at the legal and conceptual boundaries where certain types of violence generally associated with armed conflict are used. The technological features relevant here include the range, persistence, and surveillance capabilities offered by drones, and the ability to use force without physical risk to the attacker. The interplay between the potentials provided by these characteristics, and problematic patterns in use—particularly the killing of those associated with particular groups across borders—provides a basis for international discussion on preventing harm from drones as a specific set of technologies.

As a result of this particular pattern of airstrikes launched from drones, harms to people known to result from the use of explosive force in conflict—including deaths, injuries, psychological impacts, and the destruction of homes—have been documented in novel contexts. This transposition of known impacts in to different situations could also therefore apply to environmental harms. In turn, if some current use of armed drones by states has sought to redefine where particular sets of laws governing the use of force apply, such as the law of armed conflict, this also has clear implications for the protection of the environment.

Along with other impacts, potentials for environmental damage in communities that can affect human health therefore bear consideration in evaluating what the acceptable limits on the use of armed drones by states should be, and for setting standards against the facilitation of expansions in the contexts where certain types of force are used.

Environmentally risky targets

In addressing drones as a development in weapons technology, states should consider which features of systems could facilitate problematic practices or expansions in the use of force, and how the implications of these could be contained.

If one aspect of this is to consider how certain capabilities have enabled expansions in the contexts in which certain forms of force have been used, another may be to consider the potential implications of the enhanced surveillance capabilities offered by drones for facilitating attacks on targets whose destruction carries particularly severe risks of generating conflict pollution. Numerous target types have the potential to harm the environment and human health when damaged or destroyed. These include industrial, petrochemical, or pharmaceutical sites; electricity production or distribution networks; water treatment and distribution facilities; and military bases and ammunition storage areas.

The existing thresholds for what constitutes unacceptable environmental harm under IHL are [widely acknowledged](#) as being both too high, and poorly defined—though the relevant general principles of distinction and proportionality nevertheless apply in the selection of targets and of weapons, as does the principle of precaution. Reliably predicting the outcome of strikes on environmentally risky targets requires advanced knowledge of the design, state, and contents of the facility, and the ability to reliably predict the health and environmental consequences of the damage caused; factors that will be balanced against the military advantage gained from disrupting or destroying it.

While aerial surveillance data may increase the confidence of mission planners, it is unlikely that it would contribute substantially to prior knowledge of the intrinsic risks within a facility or the often unpredictable environmental outcome of its destruction. Nevertheless, it is conceivable that access to enhanced surveillance data could encourage the expansion of strikes against such targets, particularly when combined with precision weapons. This potential risk merits further investigation. In the majority of cases, the weak legal provisions protecting the environment in conflict make it unlikely that the consequences of such actions would breach

existing thresholds—even where contamination creates persistent localised risks to communities and their environment.

The lack of transparency over the use of armed drones in recent conflicts makes it difficult to determine whether access to enhanced surveillance data has facilitated the targeting of environmentally risky civilian and military infrastructure. It has been reported that drones are being used to some extent in strikes on ISIS oil operations in Syria and Iraq by the international coalition for example, [\[5\]](#) but the role and impact of the use of drones in terms of potentially raising—or reducing—environmental risks to local populations in these operations is not clear. Recent [reports](#) of the use of a small drone to destroy an ammunition dump in Ukraine with grenades, which has likely caused extensive environmental contamination, are also relevant to assessing the picture of use against sensitive industrial targets.

In identifying risks and issues, and considering potential restrictions on armed drones, states should also consider therefore whether the technology could help facilitate practices that pose particularly high environmental risks in communities, and seek data on how this and other risks may have played out in practice.

Conclusion

The environmental impacts of the use of force in general, and the use of armed drones in particular, remain under-documented as a form of harm that is relevant to assessing the limits that might be placed on different weapons technologies.

In considering how state violence should be constrained, and the contexts in which certain impacts of violence may be considered permissible or not, environmental effects with implications for human health must however be factored

in—including with respect to armed drones. The lasting environmental impacts and long-term risks to human health from the use of force must, in turn, be curbed through more robust international rules.

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References

[1] So far most research into the health risks and environmental fate of the residues from explosive weapons has been restricted to domestic training ranges, and may not be representative of their use in populated areas in conflict and other settings. See for example: Koponen, K, “Development of Guidance Values for Explosive Residues;” and Walsh, et al. “Energetics Residues Deposition from Training with Large Caliber Weapon Systems,” in *European Conference on Defence and the Environment, Proceedings 2015*, http://www.defmin.fi/files/3353/ECDE_Proceedings_2015.pdf.

[2] See for example the UN Environment Programme’s assessment in 2009 of the impact of the Cast Lead offensive in Gaza, which documented dioxins and asbestos in the conflict rubble: “Environmental Assessment of the Areas Disengaged by Israel in the Gaza Strip,” United Nations Environment Programme, 2009, http://postconflict.unep.ch/publications/UNEP_Gaza_web.pdf.

[3] See for example “Lebanon Post-Conflict Environmental

Assessment,” United Nations Environment Programme, 2007, http://postconflict.unep.ch/publications/UNEP_Lebanon.pdf.

[4] See for example Manduca P, Naim A, and Signoriello S, “Specific Association of Teratogen and Toxicant Metals in Hair of Newborns with Congenital Birth Defects of Developmentally Premature Birth in a Cohort of Couples with Documented Parental Exposure to Military Attacks: Observational Study at Al Shifa Hospital, Gaza, Palestine,” *Journal of Environmental Research and Public Health*, 2014 11:5208-5223.

[5] See for example, “RAF Tornados launch first strikes against Isis in Syria”, *The Times*, 3 December 2015, <https://www.thetimes.co.uk/article/raf-tornados-launch-first-strikes-against-isis-in-syria-rqpqq2qd88m>. Attacks have frequently been carried out by the coalition on facilities for extraction, processing, and transportation—see coalition daily reports archived by Airwars at <https://airwars.org/daily-reports>.