Monitoring water attacks

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Standfirst: Attacks on critical water infrastructure have become normalised in modern military conflict. To counter this, argues Hussam Hussein, water scientists must build and maintain real-time monitoring and documentation infrastructure in active conflict zones.

As the recent United Nations University report on global water bankruptcy makes clear, many water systems have already crossed irreversible thresholds. The deliberate destruction of water infrastructure during war accelerates this bankruptcy, yet remains dangerously unmonitored. A bombed hospital makes headlines. A destroyed water-treatment plant is rarely noticed. Why is water different? Hospitals are visible, discrete buildings; water infrastructure is distributed across pipes, wells, pumping stations and treatment plants, while the consequences of damage — disease, displacement and salinisation — can unfold over weeks or months. This invisibility makes attacks on water infrastructure politically disposable.

Over the past four years, I have documented the weaponization of water in Ukraine (2022), Gaza (2023), and most recently in the Gulf (2026). Each case revealed the same pattern: attacks were documented after the fact, condemned rhetorically, and then absorbed into geopolitical normalcy. International law prohibits attacks on infrastructure indispensable to civilian survival; but without effective enforcement, prohibition risks becoming little more than ink on paper.

The recent escalation across West Asia confirms the urgency. In several Gulf states, desalination provides the majority of municipal freshwater, making desalination plants strategic targets. A single strike can paralyse water supplies, trigger displacement, and generate a public-health crisis within hours. Water infrastructure is therefore not simply collateral damage of contemporary warfare. Its destruction can become a means of exerting pressure on civilian populations while the international monitoring response remains dangerously absent.

After four years of watching water become a weapon, I have reached an uncomfortable conclusion: documentation, while essential, is insufficient to deter future attacks. The next step should be a new paradigm. Water scientists must build and deploy independent, real-time monitoring systems for water infrastructure during armed conflict.

The problem is not the absence of legal protection. Article 54 of Additional Protocol I to the Geneva Conventions prohibits attacks on drinking-water installations and other objects indispensable to civilian survival. The International Law Commission has also reinforced protections for the environment during armed conflict. The deeper problem is the gap between prohibition and accountability. Legal accountability often depends on ex-post investigations, political will and geopolitical alignment, all of which can be absent when the alleged perpetrator is a powerful state or its ally. By the time an attack has been documented, verified, peer-reviewed and published, the war may have moved on.

Water scientists have excelled at retrospective documentation. Hydropolitics scholars have produced an important evidence base showing how water infrastructure, scarcity and control become entangled with conflict and power; but if decades of documentation have not generated sufficient behavioural change among military actors, simply producing more of the same is unlikely to create a different outcome. Evidence must become actionable.

Real-time monitoring could change the accountability calculus. If attacks on water-treatment plants, dams, pumping stations or desalination facilities were automatically detected, independently verified and made publicly available within hours, the political, legal and reputational costs of targeting them could increase substantially.

The technology already exists. Commercial satellite constellations can capture high-resolution imagery frequently; synthetic aperture radar can detect changes through cloud cover and at night; and machine-learning systems can identify changes to critical infrastructure. What appears to be missing is a purpose-built, independent and publicly accessible system designed specifically to monitor water infrastructure during armed conflict. This is therefore less a technological challenge than an institutional one.

I propose the creation of a Water Infrastructure Monitoring Initiative (WIMI): a global baseline inventory of critical water infrastructure, automated satellite monitoring during conflict, independent verification, and an open-data platform documenting confirmed damage. A coalition of UN agencies, philanthropic foundations and governments could fund such a system at modest cost relative to the human and economic consequences of water-system collapse.

Technology alone, however, will not be enough. A monitoring system is only as powerful as the willingness of international actors to use its evidence. This is where science diplomacy becomes essential. Water scientists must move beyond laboratories and publications and into diplomatic spaces. The 3rd UN Water Conference later this year offers an opportunity to advance WIMI as a formal mechanism linked to existing UN water frameworks or as a voluntary commitment within the Water Action Agenda.

Science diplomacy provides a precedent: scientists can build trusted monitoring systems that generate verifiable evidence even in politically sensitive environments. Water infrastructure monitoring should follow this model. The objective is not to eliminate political disagreement, but to ensure that claims about attacks on water infrastructure are grounded in timely, independently verifiable evidence.

Resistance is inevitable. States responsible for attacks and states politically aligned with them may oppose transparent monitoring. WIMI should therefore be designed to minimise opportunities for obstruction: through multiple satellite sources, open-source data where possible, independent verification, and partnerships with local researchers, journalists and civil-society organisations. The goal is not to persuade every actor to cooperate. It is to make non-cooperation harder to sustain.

The water science community should begin three steps now: develop a technical protocol for monitoring attacks on water infrastructure; establish links with existing UN water and humanitarian mechanisms; and build a demonstration system that can be tested retrospectively against recent conflicts, including the 2026 Gulf attacks.

Diplomats need scientific credibility. Scientists need diplomatic access. The water crisis demands both.

The world is still watching; but watching is no longer enough. We have the tools to see, verify and expose the moment a water system is destroyed. What we lack is the institutional will to build those tools into a permanent system and the diplomatic mechanisms to make their evidence matter. We cannot wait for another war to prove the same point again.

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