THE
PLOUGHSHARES MONITOR

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The human cost of the weapons trade

Canada continues to export arms to states with deplorable human rights records, including Saudi Arabia, Qatar, and Israel.

And weapons fuel the humanitarian crisis in Sudan,

CLIMATE & SECURITY
Putting the brakes on firepower

OUTER SPACE
Bringing peace and security back to Earth

EMERGING TECH
Startup culture and future wars

NUCLEAR WEAPONS
The endless dance of NPT meetings

"and they shall beat their swords into ploughshares, and spears into pruning hooks; nation shall not lift up sword against nation; neither shall they learn war any more." Isaiah 2:4

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The Ploughshares Monitor is the quarterly journal of Project Ploughshares, the peace research institute of The Canadian Council of Churches. Ploughshares works with churches, nongovernmental organizations, and governments, in Canada and abroad, to advance policies and actions that prevent war and armed violence and build peace. Project Ploughshares is affiliated with the Kindred Credit Union Centre for Peace Advancement, Conrad Grebel University College, University of Waterloo.

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From the Director's Desk

The endless dance of NPT meetings

Written by Cesar Jaramillo

Having attended several Non-Proliferation Treaty (NPT) Preparatory Committees and Review Conferences over the years, I have witnessed the persistent lack of progress on critical issues. The Second Session of the Preparatory Committee for the 2026 NPT Review Conference, held in Geneva, Switzerland from July 22 to August 2, ran true to form. Discussions seemed merely repetitive echoes from previous sessions, lacking any substantial resolution of key disputes. Such ongoing stagnation not only prevents needed change but undermines the credibility of the NPT process.

NATO nuclear-sharing practices: The never-ending Two-Step

A prime example of repetition with no realistic prospects of resolution is the decades-long debate about whether NATO nuclear-sharing practices are compatible with NPT obligations. Providing no definitive answer to this question, discussions have become simply emblems of the broad challenges facing the NPT.

At each NPT meeting, a predictable routine unfolds: most non-nuclear-weapon states (NNWS) and coalitions unequivocally denounce NATO's nuclear-sharing practices as incompatible with the NPT. They argue that the stationing of U.S. nuclear weapons in non-nuclear-weapon NATO states, coupled with joint training and planning for their potential use, directly contravenes the spirit and letter of the treaty, particularly Article I, which prohibits the transfer of nuclear weapons to non-nuclear-weapon states. NNWS declare that such practices undermine the treaty's goal of preventing the spread of nuclear weapons and create a double standard that weakens the non-proliferation regime.

In response, NATO members assert that their nuclear-sharing arrangements are fully compliant with the NPT. They argue that the weapons are always under U.S. control. Because certain interpretations of the NPT allow for these arrangements, such practices do not violate the treaty. NATO states further contend that sharing nuclear weapons is a crucial component of the alliance's collective defence strategy, and altering these arrangements would undermine NATO's deterrence posture, particularly in the face of perceived threats from nuclear-armed adversaries.

Entrenched positions on both sides reflect the broader challenge of achieving consensus on nuclear policy among states with vastly different approaches to nuclear disarmament. The absence of a clear resolution on NATO nuclear sharing not only perpetuates division but weakens the NPT's overall effectiveness as a global security instrument to regulate the behaviour of nuclear-armed states. Non-nuclear-weapon states are left feeling frustrated because their concerns are not being adequately addressed.

Bypassing Canadian regulations that bar arms sales to Israel

On August 15, *The Maple* published "U.S. names Quebec contractor in newly approved arms sale to Israel" by Alex Cosh. It examined the process by which the sale of mortar cartridges made by General Dynamics Ordnance and Tactical Systems Inc., a Canadian company with several operations in the province of Québec, has been approved by the U.S. Secretary of State. While the armaments will be shipped from Canada to the United States, the final, intended destination is Israel, even though our Prime Minister reportedly said earlier this summer that the Canadian government had "stropped exports of arms to Israel."

As Cosh notes, "According to arms-monitoring groups, the potential sale also highlights a major loophole in Canada's export controls, given the lack of adequate regulations over military goods that flow to other countries via the United States."

One of those groups is Project Ploughshares. Senior researcher Kelsey Gallagher is quoted extensively. He notes: "If these transfers were proposed for export directly from Quebec to Israel, they would be denied, and there's absolutely no justification for their export simply due to the contracting body being the U.S. government." Kelsey also emphasized the heavy costs to civilians that result from such shipments: "We know when militaries use explosive weapons in populated areas, nine out of 10 casualties usually are civilians."

FMCT redux

The recent Geneva meetings also saw a rehashing of the debate over the scope of FMCT (Fissile Material Cut-off Treaty) negotiations. The core of the debate centres on whether negotiations should address only future production of fissile materials or also include existing stocks. For years, states have taken opposing positions. Some argue that the treaty should concentrate on preventing new production to halt the spread of nuclear materials, while others believe that excluding existing stocks would leave a loophole that would undermine the treaty's effectiveness.

Despite countless hours of discussion, no agreement has been reached on how to frame FMCT negotiations. With talks stalled, no progress cam be made on a treaty that could play a critical role in nuclear non-proliferation and disarmament efforts. This inability to agree on the basic parameters of FMCT negotiations reflects deeper strategic and political divides that continue to hinder global nuclear governance.

The pursuit of a Middle East Nuclear-Weapon-Free Zone: How to engage Israel

I also observed a lack of clarity on the role that Israel, which is not party to the NPT, should play in the perennial pursuit by NPT member states of a zone free of nuclear weapons in the Middle East. Israel's non-declared but widely acknowledged status as a nuclear-armed state and its strategic relationships, particularly with the United States, the United Kingdom, and Canada, create significant obstacles in advancing this objective. The call for a Middle East NWFZ has become an annual NPT routine, but only that.

Certainly, the challenges in establishing such a zone are not limited to Israel's nuclear capabilities. The broader regional security landscape is littered with other weapons of mass destruction, including chemical and biological weapons. Add conventional military imbalances and ongoing conflicts, and the result is a security environment that does not encourage Israel to commit to denuclearization without broad disarmament and security guarantees.

Negative security assurances: Unfulfilled expectations

Also unachieved after decades of discussion are legally binding negative security assurances – promises made by nuclear-armed states that they will not use or threaten to use nuclear weapons

against non-nuclear-weapon states. Such assurances are seen by many NNWS as a crucial source of protection that reduces the perceived benefits of nuclear weapons.

Wanting to preserve strategic flexibility, nuclear-armed states have generally been reluctant to commit to such binding assurances, while non-nuclear-weapon states continue to call for stronger guarantees. This impasse highlights the broader challenges of achieving security guarantees that are both credible and acceptable to all parties involved.

Modernization of nuclear arsenals: A contradiction to disarmament

Despite commitments made under Article VI of the NPT, nuclear-armed states continue to invest heavily in the development of new types of nuclear weapons and delivery systems, which they see as necessary to maintain the safety, security, and reliability of their nuclear arsenals.

Many NNWS see such actions as contrary to the spirit of nuclear disarmament. They argue that the continued modernization of nuclear arsenals not only undermines disarmament efforts but sends a signal that nuclear weapons remain a valuable and legitimate tool of national security – but only for some. This expression of double standards within the NPT regime further erodes trust between nuclear-armed and non-nuclear-weapon states.

Breaking the cycle: The need for genuine progress

How do we break this cycle, in which states come together to restate established positions, leaving unresolved the same old problems?

The current state of stagnation not only undermines any potential for real progress; it also erodes confidence in the NPT process itself. This lack of genuine engagement on critical issues must be addressed if the NPT is to remain a viable framework for global nuclear governance.

It is time to lament and challenge this reality. NPT meetings need to evolve from a stage on which established positions are repeated to a forum that produces timely, concrete, measurable change. Such an evolution requires a recognition that repeating old axioms will not achieve change. What is needed is a concerted effort to break free from entrenched positions that have paralyzed the NPT process for far too long.

The time has come for NPT states parties to move beyond familiar routines and embrace a new approach to the critical issues facing the NPT regime. All must be willing to engage in difficult conversations, make tough compromises, and challenge the status quo. Only through such efforts can the NPT fulfill its promise to free the world from the threat of nuclear weapons. The world cannot afford to wait any longer. □

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The threat from outer space

In mid-June, *The Atlantic* published "One satellite crash could upend modern life" by Marina Koren. In this article, the journalist explores the "many forms" in which such "a seismic event" could produce "a tremendous burst of fast-moving shards, indiscriminate in their destruction, [which] will whiz through Earth's jam-packed coating of satellites, threatening to tip the world below into a new reality."

The penultimate paragraph contains a quote by Ploughshares Senior Researcher Jessica West, who noted that a potential nuclear explosion in outer space might lead to "a mass extinction event for satellites," creating hundreds of thousands of debris pieces and contaminating the environment with harmful radiation.

Jessica also provided some technical information and fact-checking.

Statement to the 2nd Preparatory Meeting for the 2026 NPT Review Conference

At the United Nations Office at Geneva, Switzerland, at the end of July, Ploughshares Executive Director Cesar Jaramillo delivered the following statement at a meeting to prepare for the 2026 conference of States Parties to the Non-proliferation Treaty. He spoke not only for Project Ploughshares but for the Canadian Pugwash group and the SEHLAC (Latin America Human Security) Network.

More than five decades after the Nuclear Non-Proliferation Treaty entered into force, the world remains overshadowed by the threat of nuclear weapons. The ongoing conflict in Ukraine has laid bare the dark underbelly of nuclear deterrence and the urgent need for an alternative approach to global security.

The conflict has been marked by a persistent narrative on both sides suggesting that a decisive military victory is in the cards. This dangerously underestimates the complex dynamics of nuclear deterrence, feeds unrealistic expectations, prolongs the conflict, and results in countless casualties. Critically, it could create conditions under which nuclear weapons might be used.

The well-documented threats to use nuclear weapons in this conflict are reckless and merit strong condemnation. But let us be clear: the primary risk lies in the very existence of these weapons, which is underpinned by the doctrine of nuclear deterrence, embraced by all nuclear-armed states and their allies, including those now rightfully alarmed at the current risk.

Ukraine presents a grim reminder that nuclear deterrence does not eliminate the risk of nuclear war; it merely cloaks it under the illusion of stability.

Despite the real possibility that nuclear weapons might be used, there is a remarkable lack of political and diplomatic leadership that prioritizes diplomatic approaches over military ones. The fundamental question thus remains: what is a realistic endgame in Ukraine – one that does not heighten the risk that nuclear weapons will be used?

A frontal challenge to nuclear deterrence was issued last year in the final declaration of the Second Meeting of States Parties to the TPNW [Treaty on the Prohibition of Nuclear Weapons]: "Far from preserving peace and security, nuclear weapons are used as instruments of policy, linked to coercion, intimidation and heightening of tensions."

The alternative, by definition, must be the establishment of common security arrangements that promote adherence to widely accepted norms and ensure a stable and predictable international order. Respect for agreements to control and limit the means of violence, including the abolition of nuclear weapons, will be crucial in this regard.

Regrettably, there is a real risk of drawing all the wrong conclusions from the Ukraine crisis. Instead of learning from the near-catastrophic risks and moving towards disarmament, the international community appears poised to engage in further militarization and nuclear proliferation. Such actions would repeat the mistakes of the past, driving the world deeper into an arms race, escalating tensions, and increasing the likelihood of future conflicts involving nuclear weapons.

In addition to the Ukraine crisis, the failure of the 9th and 10th NPT Review Conferences serves as a stark reminder of the colossal challenges facing nuclear disarmament. The inability to agree on an outcome document at two consecutive Review Conferences is regrettable, yet it highlights the profound inadequacies and deep-seated disagreements that permeate the global nuclear disarmament regime.

By now, the pattern is familiar. As Review Conferences draw to a close, any references to specific measures, benchmarks, targets, or timelines for nuclear disarmament are systematically stripped from successive drafts of the outcome document. And we all know the reason: stiff resistance from nuclear-weapon states and their allies.

The NPT has been critical to address the non-proliferation of nuclear weapons and the peaceful use of nuclear energy. But it has fallen woefully short of the goal of nuclear abolition. Today, the question is not just whether the world is better off with the NPT than without it, but whether this treaty will in fact lead to complete nuclear disarmament. The record is hardly promising.

Still, nuclear-weapon states remain unpersuaded to change course. They extol the value of nuclear weapons in safeguarding their national interests while expecting other states to forgo the same rationale. They demand strict compliance with non-proliferation obligations but neglect their own responsibility to disarm.

They accept the nuclear-weapons programs of their military or economic allies, even outside the NPT framework. They continue to spend billions of dollars modernizing their arsenals, disregarding their disarmament obligations and perpetuating the threat of nuclear conflict.

And it is not just the nuclear-weapon states that obstruct progress. States that participate in nuclear alliances, such as NATO, are directly complicit in keeping the nuclear threat alive. For far too long, nuclear-dependent states have been

Ploughshares Executive Director Cesar Jaramillo delivers a statement to the 2nd Preparatory Meeting for the 2026 NPT Review Conference in Geneva in July.

allowed to reside in two camps. When it suits, they present themselves as responsible international actors that are non-nuclear-weapon states under the NPT. At the same time, they are party to, and endorse, a security arrangement that runs contrary to the letter of the NPT and the broader goal of nuclear abolition.

Sixty-nine states – the total membership of the TPNW, all of which are also parties to the NPT – declared last year that each of the United States, the Russian Federation, China, France, and the United Kingdom is in breach of their legal obligations under the NPT – a remarkable condemnation of the highest level.

They stated that the behavior of these nuclear-weapon states "unquestionably" represents "a failure to meet their legally binding obligations under Article VI" of the Treaty. Furthermore, they declared that since the First Meeting of States Parties to the TPNW, "none" of the nuclear-weapon states have made progress… in their unequivocal undertaking to accomplish the elimination of their nuclear weapons."

Such a formal rebuke is anything but routine. The implications are profound and must reshape the discourse on nuclear abolition, prompting a reassessment of how best to respond to blatant instances of non-compliance with the NPT. This also underscores a newfound willingness among states to collectively hold NWS [nuclear-weapon states] accountable and sets a precedent for a more assertive and unified stand on this existential issue.

Of course, the fundamental problem with nuclear weapons predates and extends beyond Ukraine. However the crisis may end, the problem of nuclear weapons will persist, implicating all nuclear-armed states and their allies who overtly support nuclear deterrence.

As has been stated by many others before me, there are no right hands for wrong weapons. We will continue to reject any narrative that frames certain nuclear-armed states as more legitimate or trustworthy than others. All nuclear-armed states, regardless of their political or ideological alignments, contribute to the global risk of nuclear war. Their reliance on nuclear deterrence as a security strategy is inherently flawed and unacceptably dangerous.

The path to global security must include the complete abolition of nuclear weapons, ensuring that no state has the ability to hold humanity hostage to the threat of total annihilation. The time for decisive action is now. And it involves everyone in this room.

Thank you.

Freedom from space-based threats:

Bringing peace and security in outer space back down to Earth

Written by Jessica West with research contributed by Saad Hammadi

Space junk landing on a home in Florida. Solar storms disrupting GPS service. Renewed fears of nuclear weapons in orbit. These are a few of this year's headline-makers. Although each points to a distinct security-related concern in outer space, together they serve as a reminder that our efforts to nurture peace and security in orbit cannot ignore the dangers that space poses to Earth.

The roots of space security

Over 20 years ago, the concept of space security emerged to address the complex threats and benefits associated with outer space. Project Ploughshares worked with partners to develop the annual Space Security Index report, which defined "space security" as the "safe, secure, and sustainable access to and use of space, and freedom from space-based threats." This definition gained significant traction in public policy and international diplomacy, but the focus on space-based threats has waned over time. We must revisit these concerns to ensure that peace and security in outer space remain comprehensive, inclusive, and connected to Earth.

Expanding our awareness of space-based threats

Initial concerns about space-based threats concentrated on the weaponization of space, as some of the world's militaries attempted to develop the ability to strike at Earth from space. Examples included the Soviet fractional orbital bombardment system (FOBS) and the U.S. Star Wars program.

Today such fears are largely phantoms; the technical challenges of space-based weapons remain daunting and the implications for strategic stability self-defeating. Instead, our biggest concerns are weapons that target other space assets. Even renewed fears of nuclear weapons in space are focused on the possibility that an orbital detonation will destroy essential space infrastructure and contaminate the space environment.

We still face hazards from space itself. Solar storms, which produce beautiful auroras, wreak havoc on electricity grids and degrade the accuracy of signals from positioning, navigation, and timing satellites. Asteroids both big and small collide with our planet; some could wipe out a large city.

Human activity in space also poses harms,

Dr. Jessica West testifies before a House of Commons committee

On June 3, Ploughshares Senior Researcher Jessica West testified, virtually, before the Canadian House of Commons Standing Committee on National Defence during a session on the defence of outer space. Jessica first made a brief presentation and then responded to questions from members of the committee.

In her presentation, she explored "the nature and scope of potential threats" to space capabilities on which both the Canadian military and public depend. She emphasized "the need to avoid an overly militarized and weaponized response to defence challenges in outer space."

Jessica was clear that this viewpoint "does not negate the legitimate interests of the Canadian Armed Forces in outer space nor their role in safeguarding the ability of all Canadians to maintain the many benefits that we derive from space-based capabilities." However, "a focus on defence must include efforts to prevent escalation of conflict and arms racing in outer space."

Why are these efforts necessary? Jessica offered these reasons:

1. Outer space is "fundamentally different from terrestrial domains. There is no distinct military zone or battlefield in outer space. It is a shared environment used by military, commercial, and civilian entities from all around the world. War in space would have catastrophic ripple effects on all of these users, potentially disrupting the interconnected systems that underpin daily life around the world."
2. The operating environment in outer space "is far away from Earth, which makes [it difficult] to detect and identify harmful capabilities or activities and differentiate them from the effects of natural hazards such as debris and space weather."
3. While "investment in capabilities for detection, resiliency and redundancy through collaboration with allies is important," there must also be "awareness that such efforts often inspire adversaries to develop countermeasures, potentially accelerating arms racing dynamics." Thus "efforts to contribute greater collective clarity and stability in the space environment" must also occur.
4. Good defence "requires good governance. Militarized and inflammatory responses to perceived threats are propelling an arms race and risk geopolitical confrontation. Canada must resist such trends. Defence in outer space should not rely on tit-for-tat reactions to perceived insecurities or possible weapon systems."

including to Canada. While most space junk will burn up in the atmosphere, some will reach Earth. In 1978, the Soviet nuclear-powered satellite Cosmos-954 re-entered Earth's atmosphere and scattered radioactive debris over the Northwest Territories near Great Slave Lake. Between 2002 and 2017, Russian rocket stages containing toxic fuel were dropped into Arctic waters at least 10 times.

More recent incidents involve a piece of space junk from the International Space Station (ISS) crashing through a home in Florida this past March, and part of a SpaceX Dragon rocket used in the Axiom Mission 3 private spaceflight to the ISS landing in a field in Saskatchewan in April. These events are becoming more frequent as the number of space launches and objects in low Earth orbit increases.

Most surviving debris lands in the Pacific Ocean, often in an area known as the "spacecraft cemetery"; this is the expected site for the retired ISS. Although uninhabited by people, this marine environment is not immune to harm from the toxins in space junk. And those pieces of debris that burn up in the atmosphere upon re-entry can release aerosols that contain elements like copper,

Moving the needle on space governance

In mid-May, Ploughshares Senior Researcher Jessica West gave a virtual lecture for the Leuven Centre for Global Governance Studies in Belgium. Titled "Moving the needle on space governance: The long road to norms of responsible behaviour," her presentation made the following points:

- Norms of responsible behaviour are a core part of governance everywhere, including outer space.
- Norms are embedded in existing legal frameworks; they are not separate from other governance tools, including law.
- Norms complement, reflect, and flesh out the details of legal frameworks.
- We are always developing norms through our everyday practices in outer space.
- Formal work on norms of behaviour is a key mechanism to ensure that the norms that do evolve and develop are beneficial to everybody; it takes a collective effort to develop good behaviours and practices.

aluminum, and lithium. It doesn't take a rocket scientist to understand that returning space junk is not good for Earth's ecological health.

Some uses of space impede others. For example, light pollution and radio interference emitted by satellite constellations affect astronomy and culture on Earth. As well, capabilities that interfere with the ability to use space systems pose risks to civilians who depend on the invisible web of data that underpins much of daily life.

A more subtle yet dangerous issue is the increasing use of space-derived data to guide harmful actions on Earth. Since the launch of the first artificial satellites, military powers have used satellite data for strategic purposes. Today, the combination of the widespread availability of space-based data, much of it for sale on the commercial market, with the power of artificial intelligence makes using space for harmful purposes easier, as seen in the conflicts in Ukraine and Gaza. Canada's Department of National Defence calls this the "digitization of defence" and it comes with severe human consequences.

Many more harms stemming from the uses of space are detailed in *Hidden Harms: Human (In)security in Outer Space: Consultation Report*, published by Project Ploughshares in July.

The need to account for risk

Current approaches to space security need to better account for and prevent the various harms that can arise from space activities. Although the Convention on International Liability for Damage Caused by Space Objects requires states to compensate for damages on Earth that are caused by their space objects, many space-related harms don't fit neatly into this category; they are less visible, less directly attributable, and more dispersed. International humanitarian law offers another avenue to protect civilian users of space but primarily addresses violent actions, leaving harmful effects below the threshold of armed conflict unregulated.

Space-related harms are often overlooked in diplomatic discussions that focus on the freedom to use space and protecting space systems. This approach ignores the unequal distribution of benefits from space activities and the fact that some people suffer harm as a result of the use of space by others.

Academics Shona Illingworth and Nick Grief from the University of Kent have proposed an Airspace Tribunal to explore the need for a new human right, "to live without physical or psychological threat from above," which includes threats from space. However, we don't need to wait for new international laws to start considering the impact of our space activities on the well-being of others and the planet.

Expanding the space security framework

Raising awareness and increasing the visibility of space-related harms are essential first steps in identifying and mitigating risks. A key finding from the consultations reported on in *Hidden Harms* is that many harms linked to space

A major new report on feminism and outer space

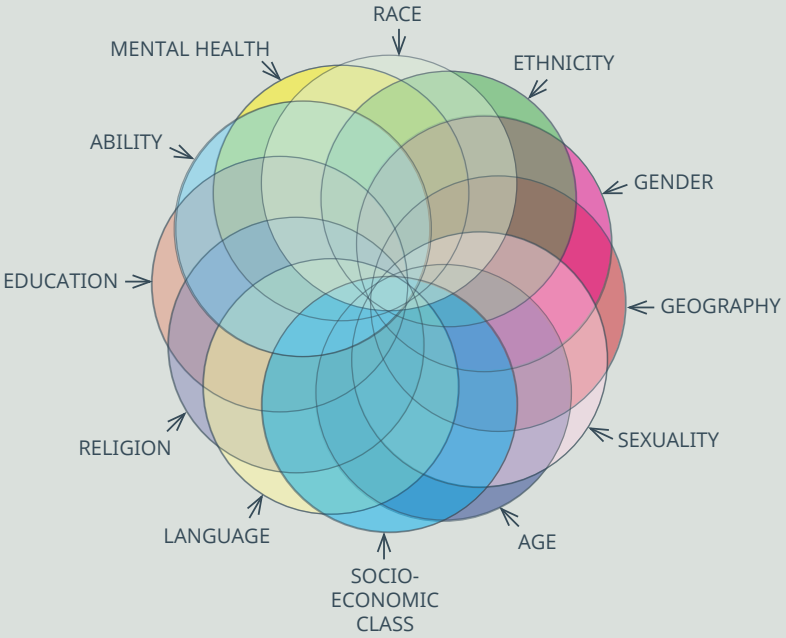
On July 10, Project Ploughshares published a consultation report: Hidden Harms: Human (In)security in Outer Space, authored by Ploughshares Senior Researcher Jessica West with research assistant Vaishnavi Panchanadam from the University of British Columbia. Nine students, including two Ploughshares summer interns, were part of the international group of facilitators, researchers, and rapporteurs who organized the July 2023 workshops and surveys on intersectional perspectives related to human security and insecurity in outer space, on which this report is based. The research and the resulting report were supported by a grant from the Mobilizing Insights in Defence and Security (MINDS) program of the Canadian Department of National Defence.

This study was intended "to uncover the many ways in which human well-being is connected to the security of outer space." The use of an intersectional feminist approach allowed researchers to gauge "how gender and other social identities overlap in ways that may compound the benefits, harms, and insecurities that people experience in relation to outer space and space systems."

As explained in the "Overview" section of the report, authors and associates aimed to:

> "
> - better understand the differentiated human implications of security and insecurity related to outer space;
> - articulate diverse experiences of insecurity related to outer space to inform both domestic and global policy responses;
> - consider alternative approaches to, and perspectives on, peace, security, and disarmament that might provide new ways of identifying, thinking about, and responding to the collective security environment in outer space;
> - expand the scope of dialogue on gendered and intersectional approaches to peace and security in outer space and inspire additional research by others. "

Hidden Harms is intended to "launch additional, deeper discussions, research, and diplomatic efforts on the various themes and takeaways identified by this initial conversation." At the top of the invitation list are "people who might not otherwise feel that they have a place in this community."



Ploughshares cited in UN Human Rights Council report

In April, the Office of the United Nations High Commissioner for Human Rights published *Impact of arms transfers on human rights*, which "examines the role of access to information in preventing, mitigating and responding to the negative human rights impacts of arms transfers."

Section IV deals with "Specific concerns related to the lack of information on arms transfers." There is a reference to Canada under subsection A "Insufficient proactive publication of information on arms transfers":

> With respect to Canada, limited data was reported with respect to arms transfers to the United States, which has been estimated to amount to approximately 50 per cent of all its transfers.

The two sources cited in this quotation are Global Affairs Canada and Ploughshares Senior Researcher Kelsey Gallagher in the Autumn 2023 *Ploughshares Monitor*.

are shrouded by layers of invisibility that result from a lack of adequate public knowledge and data, compounded by the complex ways in which people are connected to space. Making visible the problem of light pollution from space, for example, has been key in getting discussions on dark and quiet skies on the agenda of various United Nations bodies.

To address these issues comprehensively, we need to develop a clearer language and framework to discuss the risks, harms, and threats associated with space. Many of these concerns are missing from a lot of current definitions of space security. When concerns are recognized, they are often treated as exceptions rather than inherent features of the space environment.

A focus on freedom from space-based threats forges a stronger connection between space activities and their impact on Earth. This perspective not only promotes a more inclusive understanding of space security but encourages us to consider the often-hidden harms linked to space activities.

Turning our gaze to the potentially harmful effects of the space environment and space activities doesn't impede our ability to use and benefit from space. Instead, it broadens our understanding of the diverse security needs related to space and the variety of harms that require mitigation and accountability. □

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Arming the world's bullies

In July, *Jacobin* published an article by Senior Researcher Kelsey Gallagher. In "Canada is arming the world's bullies," Kelsey provides evidence that "Canada is arming some of the world's most repressive governments with military goods." These customers include Saudi Arabia, the United Arab Emirates, and Qatar. The article includes data on arms sales to Israel, identified as "another persistent human rights violator."

Kelsey also explains, to what may be a new audience, the flaws in Canada's reporting of arms exports. He cites "a lack of transparency in Canada's arms control system," which makes it difficult to determine which technologies are being exported and to whom. Much of this lack of clarity is because Canada does not report on the vast majority of sales to its largest customer, the United States. And in some cases, American manufacturers add Canadian components to their weapons systems. These systems are then exported to other countries. This is the case with Canadian components in weapons such as the F-35 Joint Strike Fighter aircraft, which has, as Kelsey notes, "played a major role in Israel's ongoing bombardment of Gaza."

In this article, Kelsey argues that Canada has moral and legal obligations to stop arming authoritarian governments as well as states that abuse human rights and commit war crimes.

Startup culture and future wars

Written by Branka Marijan

On contemporary battlefields from Ukraine to Sudan to Myanmar, small, inexpensive drones or quadcopters are ubiquitous. Most are not produced by defence manufacturers but rely in large part on civilian technologies.

Do-it-yourself military hardware

In Ukraine, assembling these small drones is often a do-it-yourself project that can include everyone from shop clerks to experienced engineers. These efforts, which are supported by the national government and private companies, could be said to characterize modern warfare. They allow an increasing role for tech companies and entrepreneurs that enable or support the use of new technologies, from commercially available artificial intelligence (AI) software to small drones.

It is noteworthy that building small drones and leveraging off-the-shelf technology are not only practices of smaller or less powerful states. The Replicator program of the United States is focused on developing "small, smart, cheap, and many" drones that can counter China's growing military power and could cement a vision of future warfare. The program is expected to spend some $500 million, in 2024 and a similar amount in 2025.

What is perhaps most significant is the widespread drive to infuse startup culture into military operations. Leveraging the rapid development cycles of the tech industry seems to be fostering a culture of innovation that is in sharp contrast with the often slow, bureaucratic nature of traditional military procurement.

As professor of political theory at Queen Mary University of London Elke Schwarz has observed, in this new vision of warfare, expertise is found not in militaries but in technologists. However, as Schwarz reflects in a forthcoming book chapter, "The Silicon Valley ethos 'Move Fast and Break Things' is a tragic motto for military operations." As startup culture becomes more involved in, and integrated into, the defence sector, it is crucial to scrutinize the impact on the character of warfare, particularly the treatment of civilians.

The expanding market for commercial drones

Writing in the September/October 2024 issue of *Foreign Affairs*, former U.S. Chairman of the Joint Chiefs of Staff Mark A. Milley and former Google chief executive Eric Schmidt see wars becoming technological competitions: "Future wars will no longer be about who can mass the most people or field the best jets, ships, and tanks. Instead, they will be dominated by increasingly autonomous weapons systems and powerful algorithms."

Milley and Schmidt believe that, despite substantial investments in military technology, the

The power of the chip

On July 24, Ploughshares published another major report: *When the chips are down: Can middle powers navigate the Great Powers' high-stakes semiconductor game?* Co-authored by Ploughshares Senior Researcher Branka Marijan, one-time Ploughshares interns Rebekah Pullen and Dmytro Sochnyev, and former research fellow Roman Vysochanskyy, this report was made possible by a grant from the Mobilizing Insights in Defence and Security (MINDS) program of the Canadian Department of National Defence.

When the chips are down explains the importance of semiconductors in global security today; they are "central components of both major defence systems and platforms, and many ubiquitous civilian technologies." But only a few countries, notably Taiwan, Japan, the Republic of Korea, and the Netherlands, control manufacturing and distribution of these chips. The desire of Great Powers—the United States and China—to extend their control over these vital components has significant implications for all states that rely on imported semiconductor technology but "acknowledge that today's complex global supply chains make national sovereignty in semiconductor production infeasible for them."

The report explains how "middle powers, including Canada, could find themselves on shifting ground." The "Great Power competition" has already had an impact on certain parts of the world, such as the Middle East.

This timely report indicates that "the continued competition between the Great Powers contributes to the further destabilizing of the global order and requires diplomatic responses." It concludes: "In such a challenging landscape, the need for forward thinking, collaborative problem-solving, and strategies that balance domestic and international goals is undeniable."

United States has fallen behind adversaries Russia and China, which are devoting attention and resources to the testing of AI-enabled systems and drones. To counter these efforts, the authors recommend that the U.S. military adopt a nimbler structure, awarding shorter-term contracts and procuring new technologies more quickly.

Milley and Schmidt describe expanding technological creep from the commercial sector to the military. Chinese drone makers, notably Da-Jiang Innovations (DJI), already supply "90% of the US consumer [drone] market and 70% of the industrial one." DJI has also captured more than 70 per cent of the global market for consumer drones. Now, DJI drones are being used extensively by both Russia and Ukraine in the war in Ukraine, even though the company suspended sales to both countries in April 2022 and has publicly opposed use of their drones in warfare.

This past May, Ukraine announced that it had recently purchased about 8,200 DJI Mavic drones. A US$27.5 million contract for 4,200 drones included drones ranging in price from "$3,157.50 for the DJI Mavic 3E and around $4,855 for the DJI Mavic 3T." According to journalist David Hambling, the Mavics are being used for intelligence gathering and reconnaissance but also to guide targeting, making artillery "five to ten times as effective" and allowing much more precise long-range firing from tanks.

The appeal of these drones to militaries worldwide is evident. What attracts as much as anything is an affordable price and the ready availability of the commercial drones, which can be easily modified to accept a variety of payloads.

Humanitarian impacts of innovation

While undoubtedly useful in meeting military needs, in Ukraine and other battlegrounds drones and new technologies are being used in ways that undermine arms control and disarmament efforts, pose significant challenges for post-conflict reconstruction, and contribute to higher civilian death counts.

Ukrainian engineers have developed a "spe-

cial fuse" that allows mines to be dropped from drones and armed after landing. While these mines are generally anti-vehicle and not prohibited by the 1997 Mine Ban Treaty, which specifically prohibits anti-personnel mines, the broader implications for civilian safety and the erosion of established norms remain deeply troubling.

Russian forces are making extensive use of both anti-vehicle and anti-personnel mines. A version of the latter uses seismic sensors so that even stepping close to the mine sets it off. Approximately 1,000 Ukrainian civilians have been killed by anti-vehicle mines alone, most when they returned to farms in which mines had been planted.

Another innovation is wreaking devastation on civilians in Gaza. Yuval Abraham in *+972 Magazine* describes how the Israel Defense Forces (IDF) have used AI-enabled target generation system Lavender in Gaza. While a human reviews the AI-generated target list, it appears that commanders spend an average of just 20 seconds per target, often only verifying that the recommended target is male.

Abraham's reporting also highlights the use of other AI-enabled systems by the IDF in Gaza. Despite promises that such tech would allow cleaner, more precise targeting, the result has been overwhelming destruction and loss of life. According to UN figures, the death toll in Gaza as of August 26 stood at more than 40,000. While these figures are frequently disputed, there is widespread acknowledgment by international organizations that most victims are civilians, many young children.

Now momentum is building to establish a norm against the use of anti-vehicle mines. Other measures that will protect civilians from the impacts of new technology are also being studied. However, these efforts are increasingly undermined by evolving battlefield dynamics and the lack of political will among states to confront them.

Regulating innovation

Many of the new technologies that are being tested and fielded on the battleground were never intended for military use. Others have emerged from a relentless push for innovation without sufficient regulation or testing.

"Tech companies often lament the sluggishness of defence departments that, they claim, stifles modernization. They see a remedy in startup culture, which offers the agility needed to prepare for future wars. What is often left unsaid is any serious consideration of the impacts the resulting innovations may have on civilian populations, the environment, and broader global security.

Tech companies often lament the sluggishness of defence departments that, they claim, stifles modernization. They see a remedy in startup culture, which offers the agility needed to prepare for future wars. What is often left unsaid is any serious consideration of the impacts the resulting innovations may have on civilian populations, the environment, and broader global security.

At a tech defence summit this past January, U.S. Deputy Secretary of Defense Kathleen Hicks remarked, "Yes, moving fast and breaking things is necessary to win wars." She added, however, that the United States would never break the law or go against the U.S. Constitution.

Now, however, the organizations in charge of international regulation and diplomacy are struggling to keep pace with rapidly advancing technology that doesn't account for humanitarian and environmental costs. And so now what the world needs, urgently, are innovations in diplomacy that can adapt to these new technologies and produce norms that preserve global stability. □

Branka Marijan is a Senior Researcher at Project Ploughshares. She can be reached at bmarijan@ploughshares.ca.

Canada's weapons exports in 2023

High numbers driven by transfers to human rights violators

By Kelsey Gallagher

Each year, Global Affairs Canada (GAC) releases its *Exports of military goods and technology* report, which provides details on the Canadian military goods exported around the world. The most recent report covers the 2023 calendar year.

The report shows that Canada continues to transfer historically high levels of military goods abroad. The large numbers have been driven, in part, by exports to states with deplorable human rights records, including Saudi Arabia, Qatar, and Israel.

Overview

As shown in the *2023 Exports of military goods and technology* report, for that year Canada reported exports totaling $2.143 billion[1] in military goods to non-U.S. destinations – a decrease of 2.8 per cent from 2022 ($2.204 billion) and almost 50 per cent less than Canada's exports in 2019 ($4.308 billion), when these exports reached their peak.

The main driver of these exports continued to be Saudi Arabia. In recent years, this state has accounted for more than 50 per cent of non-U.S. exports. However, in 2023, Saudi Arabia imported $904.557 million in Canadian arms, 42.2 per cent of non-U.S. exports. In 2023, Canada also transferred arms totaling $1.238 billion – the largest such figure on record – to countries other than the United States and Saudi Arabia. This statistic illustrates that Canadian arms manufacturers are finding new markets and diversifying export destinations.

While last year's total was lower than that of some recent years, it remains historically significant. It was substantially higher (61.8 per cent) than the total for other previous record-breaking years, including 2012 ($1.324 billion), and nearly double the total for the previous peak year, 2003 ($1.122 billion).

Some of Canada's top weapons customers

SAUDI ARABIA

In 2023, the high value of Canada's arms exports to Saudi Arabia continued to be driven by the 2014 Canada-Saudi arms deal, the largest in Canadian history with a price tag of $14 billion. Under the terms of the contract, London, On-

1 Unless otherwise noted, all figures are expressed in constant Canadian dollars.

Year	ACV exports (units)*	ACV exports (values)**
2023	40	$741,198,130
2022	55	$1,062,847,794
2021	116	$1,664,926,212
2020	79	$1,231,348,633
2019	183	$2,812,196,802
2018	127	$1,251,700,976
2017	52	$454,175,069

*Information on units sourced from Canada's annual submission to UNROCA.

**Values sourced from Canada's annual *Exports of military goods and technology* reports, Annex G, Export Control List Category 2-6 exports to Saudi Arabia. ACV export figures are expressed in current Canadian dollars.

tario's General Dynamics Land Systems-Canada (GDLS-C) is to supply the Saudi Royal Guard with 742 light armoured vehicles (LAVs). The vehicle variant, the LAV-700, is the most advanced available today.

According to Canada's submission to the United Nations Register of Conventional Arms (UNROCA), which collects data on actual arms exports rather than their sum value, Canada transferred 40 armoured combat vehicles (ACVs) to Saudi Arabia last year. Since 2017, Canada has transferred 652 of these vehicles to the Saudi government. While Canada does not typically disaggregate the make and model of ACV transfers in its reports to UNROCA, it can be assumed that the majority of such transfers to Saudi Arabia since 2017 have been GDLS-C LAV 700s.

UKRAINE
Explaining how Canadian military aid works

Canada has exported significant levels of military goods to Ukraine since Russia's full-blown invasion in February 2022. According to the 2023 report, Canada transferred military goods valued at $416.7 million to Ukraine that year. The bulk of these goods ($359.8 million) were ACVs and associated components, followed by small arms ($54.2 million).

However, this is not the whole picture. Most of Canada's arms transfers to Ukraine since early 2022 have been in the form of military aid. While typical arms exports are licensed on a case-by-case basis by officials at GAC, military aid follows a parallel process overseen by the Department of National Defence (DND). One feature of this process is that most military aid does not appear in official export values published in the *Exports of military goods and technology* report.

In addition to the $416.7 million in military goods that Canada reported exporting to Ukraine in 2023, Canada also provided military aid that included eight Leopard 2 main battle tanks (MBTs), 253 guided missiles, and more than 21,000 small arms and light weapons and associated ammunition. Using available information on the per-unit cost of this equipment, Project Ploughshares conservatively estimates that Canada's military aid to Ukraine in 2023 would be valued at more than $300 million. Therefore, the actual value of Canada's arms transfers to Ukraine last year was closer to $716.7 million. This assessment only includes transfers of military aid that were confirmed to have been totally completed in 2023 and not those transfers that occurred over more than one calendar year; it also assumes lower ex-

port values for MBTs transferred from existing Canadian Armed Forces stocks.

Although reporting on Canada's transfers of military aid still has transparency gaps, for the first time, the 2023 GAC report provided a comprehensive overview of DND's risk assessment process when conducting exports of military aid, including information on the risk assessment performed by DND officials.

GERMANY AND UNITED KINGDOM

The next largest customers for Canadian arms were Germany ($111.1 million) and the United Kingdom ($106.9 million). Both countries have long been steady customers of Canadian military goods.

In 2023, Canada's largest exports to Germany, as categorized under Group 2 of the Export Control List (ECL), were: training and simulation equipment ($28.7 million); imaging, sensor, and target acquisition technology ($15.4 million); and military aircraft and associated components ($14.7 million). Canada's top three ECL Group 2 exports to the United Kingdom were technology ($22.6 million), military aircraft and associated components ($12.5 million), and electronic equipment and spacecraft ($11.8 million).

QATAR

Qatar took fifth place, with arms transfers valued at $73 million – the highest amount ever recorded for this state and a major increase over the previous high of $51.1 million in 2022.

Most exports in both 2022 ($33.3 million) and 2023 ($60.9 million) fell under the export category for training and simulation equipment. Although details on individual contracts are not included in the report, these figures likely result from a number of high-value, multiyear deals between the Qatari government and CAE Inc., one of the world's premier manufacturers of military aircraft simulators, based in Saint-Laurent, Québec.

ISRAEL

Last year, Canada exported more weapons to Israel ($30.6 million) than at any point in its history. Arms exports to Israel have been on an ascending trendline in recent years. GAC reported transfers of $28.9 million in 2021 and $22.1 million in 2022.

Reports of increasing weapons exports to Israel have coincided with a campaign of unprecedented violence and destruction in Gaza by the Israel Defense Forces. Israel has been facing near-constant allegations of violating international humanitarian law, including some cases that likely constitute war crimes.

As of August 26, more than 40,000 Palestinians, most civilians, had been killed since the onset of Israel's operation in Gaza following the October 7 attacks. Much of the Gaza Strip lies in ruins from Israeli airstrikes. There is considerable concern that some of these abuses could have been facilitated, in part, with Canadian-made weapon systems.

Under Article 7.3 of the Arms Trade Treaty, to which Canada is a State Party, Canadian authorities cannot authorize arms exports that pose a substantial risk of being used in such abuses. Given Israel's conduct throughout its operation in Gaza, this threshold has evidently been met, and in a move reflecting Canada's Treaty obligations, Canadian officials paused the further authorization of arms transfers to Israel on January 7 of the current year.

However, this pause does not extend to arms exports previously authorized. In 2023, GAC issued 193 individual export permits for arms transfers to Israel, all of which remain valid unless the respective transfers have already taken place. And according to documents recently released by the Standing Committee on Foreign

Providing a dose of economic realism

On June 5, *The Hill Times* published an article by Neil Moss entitled "Amid focus on defence investments, advocates say diplomatic toolkit being ignored." In it, Moss explored what Douglas Roche has reportedly called "a resurgence of militarism."

In this article, Ploughshares Senior Researcher Kelsey Gallagher provided a dose of economic realism. In one quote he noted: "In any given year, most of the military goods produced in Canada are destined for export. Canada's defence industry—like others—is export reliant."

Kelsey also debunked—again—the notion that Canada is sending only non-lethal items to Israel. As Moss observed, "Gallagher said there is no basis in Canada's arms control regime to define exported goods as 'lethal' versus 'non-lethal.'" While Kelsey opined that "the federal government is likely defining parts and components as 'non-lethal' compared to full systems and small arms as 'lethal,'" he noted that "parts and components are required for the operation of a weapons system. It doesn't matter if these systems being exported to Israel are components or they are full systems, they still are subject to Canada's arms controls obligations."

According to Kelsey, exporting components comes with a "very real risk" that the systems could be used in conflict. He called for "a more principled approach from the government to ensure it is fulfilling its own obligations."

THE HILL TIMES

Affairs and International Development, a total of nearly $100-million in export permits for the transfer of weapons to Israeli companies or the Israeli government remain valid.

Canada's arms exports to authoritarian regimes

When all these exports are taken together, it is clear that a substantial portion of Canada's total arms exports are destined for states deemed to be authoritarian by international civil and political rights monitors.

The annual Freedom House *Freedom in the World* report ranks states on a continuum from Free to Not Free according to the rights enjoyed by citizens. Findings for 2023 indicate that 49 per cent of Canada's arms exports, valued at roughly $1.04 billion, were imported by authoritarian states deemed "Not Free" by Freedom House.

To Saudi Arabia and Qatar can be added "Not Free" Algeria ($17.1 million of Canadian arms exports transferred in 2023), the United Arab Emirates ($13.3 million), and Chad ($1.5 million). Many of these despotic states, particularly Gulf States, are long-time customers of Canadian arms, reflecting an established trend in which Canada has been providing weapon systems to authoritarian governments. Canadian officials have gone on record criticizing some of these states for horrendous human rights abuses, while at the same time providing munitions that prop up these regimes. □

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Weapons fuel humanitarian crisis in Sudan

Written by Jennifer Jaeger

Since April 2023, Sudan has once again been experiencing intense and violent internal conflict. In July 2024, the Armed Conflict Location and Event Data Project reported that since the current war began, more than 18,760 people had been killed. This number is likely underreported, as the United Nations (UN) Panel of Experts on the Sudan estimated that up to 15,000 people were killed in El Geneina, West Darfur alone in 2023. More than 12 million Sudanese have been displaced from their homes and 25.6 million—more than half of the country's population—are facing critical levels of hunger.

Central to this turmoil is the pervasive influx of weapons into the region—a factor often overlooked.

Despite international sanctions, foreign actors continue to fuel the war by supplying weapons to the conflict parties. Such actions only exacerbate the humanitarian crisis and undermine efforts for peace. As Sudan receives little international attention and warring parties continue to target civilian areas, both understanding weapons flows and taking decisive action to curtail the spread of weapons are critical.

The anatomy of the conflict

The current conflict grows out of a complex history of political power struggles, ethnic tensions, and systematic economic marginalization. Since civilian protests prompted the coup d'état of President Omar al-Bashir in 2019, attempts to establish a transitional civilian-led government and reach a peace agreement have been unsuccessful.

Sudanese Armed Forces (SAF) General Abdel Fattah al-Burhan, with the support of Rapid Support Forces (RSF) leader Mohammed Hamdan Dagalo—both perpetrators of the 2003 genocide in Darfur—took full control of Sudan's government in 2021. In December 2022, the two leaders signed a Framework Agreement for a transition to a civilian-led government in which the military would no longer have a formal role. However, the leaders could not settle on a process for security sector reform, as it did not align with the desire of both men to preserve their extensive economic empires. As a result, violent clashes between the RSF and the SAF broke out in April 2023. Burhan remains the de facto head of state, although there is no functional, legitimate government. Sudanese grassroots civil society organizations continue to advocate for freedom, justice, and peace.

This multidimensional conflict, marked by shifting alliances, localized violence, and targeted attacks on civilian areas, has created ideal conditions for the proliferation of arms.

The influx of arms: A perilous escalation

The sheer number and illicit nature of arms exports to Sudan make it impossible to estimate with any certainty the number of weapons entering the country. The Small Arms Survey estimated that there were more than three million weapons in Sudan in May 2023. According to Agence France-Presse (AFP), a government commission

estimated that five million weapons were held by civilians at the end of 2022. What is clear is that Sudan is awash in assorted types of conventional arms; even so, smugglers reported to the AFP that dealers cannot keep up with demand.

The arms come from various sources, including international and regional arms dealers, neighbouring countries, and internal stockpiles. Porous borders, coupled with weak governmental control, have made Sudan an attractive destination for illicit arms traffickers. The UN Panel of Experts reported that weapons ranging from small arms to advanced military equipment were being smuggled into the country, often ending up with parties located or operating in Darfur, which is under UN sanctions.

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Within the first few months of the war, the RSF had established new weapons supply routes that contributed to an escalation of its efforts: capturing cities in the Darfur region, ransacking major SAF manufacturing facilities, and cutting off SAF supply routes. The procurement of more sophisticated weapons allowed the RSF to take on the Sudanese Air Force, changing the dynamic of the conflict. The RSF continues to overpower the SAF in most regions of the country.

Major suppliers and supply routes

One particularly concerning aspect of this conflict is the involvement of foreign powers. Actors with vested interests in Sudan's resources and strategic location have been implicated in supplying arms to the warring parties. The international community's failure to enforce the longstanding UN arms embargo on the Darfur region and to hold violators accountable makes the situation worse.

While it remains difficult to create a complete picture of arms flows to Sudan, useful information on suppliers to the SAF, RSF, and the Sudanese black market can be gathered from the Stockholm International Peace Research Institute (SIPRI) Arms Transfers Database, the *Final Report of the Panel of Experts on the Sudan* from January 2024, Amnesty International's recent study of arms used in the conflict, research from the German Institute for Global and Area Studies, and media sources.

Sudanese Armed Forces

The SIPRI Arms Transfers Database indicates that over the last decade the SAF supplemented its domestically produced weapons with military imports such as artillery, aircraft, missiles, and armoured vehicles from Russia, Belarus, the United Arab Emirates (UAE), and China. Amnesty International found that the SAF is largely supplied by partially state-owned Russian companies and a major Turkish weapons manufacturer. Iranian-made drones acquired in early 2024 have reportedly allowed the SAF to gain ground in Khartoum. The SAF has likely received its supplies through Port Sudan, where Burhan's headquarters are located.

Amnesty International identified large quantities of recently manufactured weapons and military equipment used by both the SAF and RSF that were exported to Sudan by partially state-owned Russian companies and various Turkish military manufacturers. Both parties also used Serbian, Yemeni, and Chinese small arms (origins unconfirmed) throughout Sudan, including Darfur.

Rapid Support Forces

The SIPRI Arms Transfers Database does not contain information about arms transfers to the RSF. However, the RSF has evidently maintained

close ties with the UAE, the Wagner Group, the Libyan National Army (LNA), and South Sudanese officers. The RSF maintains a complex network of proxy companies, entities, and new and preexisting supply routes that it reinforces with major regional arms trafficking routes. The UN Panel of Experts discovered major RSF supply routes for military equipment and fuel from Chad, Libya, the Central African Republic, and South Sudan.

UAE and Wagner Group affiliations with the RSF seem to extend beyond involvement in Sudan's lucrative gold industry. The UN Panel of Experts tracked frequent arms shipments from the UAE to the RSF via Chad, with regional stops in Kenya, Rwanda, and Uganda. These shipments allegedly contained man-portable air defence systems (MANPADS), ammunition, drones, fuel, and medical equipment. Amnesty International confirmed the RSF's possession of a variety of recently manufactured armoured personnel carriers from the UAE, but the UAE officially denies allegations of illicit involvement.

The Wagner Group, a Russian state-funded private military company, has likely supplied the RSF with air cargo, MANPADS, ammunition, fuel, training, and several hundred mercenaries. The Wagner Group and the LNA have allegedly cooperated to supply the RSF with surface-to-air missiles, anti-aircraft weaponry, air cargo, vehicles such as Landcruisers, and discounted fuel via the Central African Republic, Chad, and Libya.

The UN Panel of Experts also found that the RSF had secured a fuel supply from South Sudanese officers, with weekly deliveries from South Sudan to South Darfur.

Arming civilians

Escalating insecurity, military recruitment of civilians, and targeted attacks on civilian areas have led to a proliferation of small arms among Sudan's civilian population. Eritrea, Ethiopia, and parts of Sudan's coast are points of entry for small arms that could end up in civilian hands. Some civilians, especially allied militias and recruits in Darfur, are also armed by the RSF.

Humanitarian impact: A growing catastrophe

The influx of weapons has had catastrophic consequences for Sudan's civilian population. Armed groups, emboldened by their access to sophisticated weaponry, have committed widespread atrocities. The UN Panel of Experts highlighted evidence of alleged violations of international humanitarian law by the RSF, SAF, and allied militias in 2023, including targeting of civilians, destruction of critical civilian infrastructure, child recruitment, sexual violence, mass forced displacement, and obstructing the distribution of aid.

The presence of so many weapons results in persistent violence that hinders the delivery of aid and makes most areas inaccessible to humanitarian assistance. The SAF, RSF, and allied groups also regularly deny humanitarian access to areas controlled by the opposition. The resulting insecurity increases the suffering of vulnerable populations. Additionally, the destruction of infrastructure by armed groups further isolates communities. Because of the war, more than 80 per cent of Sudan's hospitals are no longer in service and 25 million people are in urgent need of humanitarian aid.

The horrific humanitarian consequences of this armed conflict are made more severe by climate change. Hotter winters and longer, more intense rainy seasons increase stress on the country's already limited resources, destroy infrastructure, displace civilians from their homes or shelters, and further complicate aid delivery.

Call for action

The crisis in Sudan is a stark reminder of the devastating impact that unchecked arms proliferation can have on a nation and its people. The international community must take immediate, decisive action to control the flow of weapons into the region, enforce UN sanctions, and ensure the protection of civilians. □

Jennifer Jaeger has a Master of International Public Policy from the Balsillie School of International Affairs. She was a Ploughshares Peace Research intern in summer 2024.

Putting the brakes on firepower

By Jessica West

As the summer months in Canada wind down, signs of the climate emergency are all around: extreme heat, violent hurricanes, flooding, raging wildfires, and a melting Arctic. These effects are changing how we live our daily lives, our travel plans, the building materials we choose, how we plan for emergencies, energy consumption—indeed, every facet of our lives.

How we envision and pursue peace and security in Canada will and must also change. From a climate perspective, the Arctic, which is warming four times more rapidly than the rest of the planet, is particularly vulnerable. For this—and other more political—reasons, it is not surprising that a focus on the implications of climate change in the Arctic is at the heart of the federal government's revamped vision for defence that was published this past May. Our North Strong and Free: A Renewed Vision for Canada's Defence calls for "full community engagement and rethinking how we approach the defence of our country."

Project Ploughshares is contributing to this rethinking. With funding from the *Mobilizing Insights in National Defence and Security (MINDS) program of the Department of National Defence*, we gathered experts in Ottawa on June 19 and 20 to identify key implications of the worsening climate crisis for Canadian defence. A report on those findings will be published on the Project Ploughshares website in the coming months.

A key concern that came out of this workshop is that much defence thinking in the context of climate change reflects a continuation of "business as usual" and is rooted in concerns about borders, geopolitical competition, and weapons. But as Earth continues to heat up, future risks and collective security needs are anything but usual.

A reduction in the firepower that fuels both climate change and warfighting must be part of the solution. This is the message from the workshop's keynote speaker, Dr. Simon Dalby, author of *Pyromania*. This new reality also explains why organizations like Project Ploughshares, which has long contributed to global peace and disarmament efforts, must also be engaged in finding solutions to the climate emergency. A shift away from fossil fuels must include a shift away from war and the weapons that expend so many limited resources and create such havoc in Earth's environment.

Everyone interested in building peace must prioritize a resolution to the climate crisis. We can no longer ignore the role that climate plays in a peaceful world and we cannot achieve peace while the climate emergency rages on.

Clockwise from top left: The audience listens to keynote speaker Dr. Simon Dalby on June 19; Ploughshares Intern Ashoke Mohanraj presents to workshop participants on June 20; Ploughshares Senor Researcher Jessica West and Executive Director Cesar Jaramillo listen to workshop participants on June 20; workshop participants Kenneth Epps, left, and Robin Collins sign into the event on June 19; Cesar opens the workshop on June 19.
Photos: Mehnaz Morshed

In memoriam

On June 25, Phyllis Creighton died, at 94.

As her obituary notes, Phyllis was a “life-long volunteer,” focusing her efforts on “how to make and keep life human; how to show love and respect for human beings and for Earth and to raise awareness that **the moral is the practical**” (her words).

Phyllis “worked actively to create peace in the world and an end to nuclear weapons.” Among her many causes was Project Ploughshares; she served on the Board as a representative of the Anglican Church of Canada.

Thank you, Phyllis.