Eyes from above

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Eyes from above: Leveraging Satellite-Based Monitoring to Combat Labour Exploitation and Human Trafficking in the Arctic

Executive Summary

This policy brief proposes a governance framework for using satellite-based monitoring to detect, analyse and prevent labour exploitation and human trafficking in the Arctic. The rapid Arctic Industrialisation, such as in mining, fisheries, infrastructure projects for military and civil purposes, and maritime transport, creates structural vulnerabilities to these problems. Satellite-based monitoring, embedded in rights-based governance structures, could help prevent labour exploitation and human trafficking, and could function as an early-warning and risk-assessment tool.

The Arctic as a Structural Vulnerability: Problem Definition

As US Senator Mike Moore has put it: “While human trafficking may not be something we think about often, we cannot turn a blind eye to this devastating, prevailing issue. Not only is human trafficking a multi-billion dollar global industry, it is the second-largest and fastest growing black market in the world.”

The Arctic is characterized by a series of structural conditions that make it particularly susceptible to labour exploitation and human trafficking. These include geographic remoteness, limited oversight capabilities, and the proliferation of high-risk industrial sectors that depend on seasonal and migrant labour across multiple national jurisdictions. Limited access to news channels and security infrastructure such as the police further compounds the issue.

The following labour sectors are considered high-risk in the Arctic region:

These sectors also pose high risk for indigenous communities in remote areas, who carry the biggest burden of, for example, infrastructure projects. While some indigenous communities’ existence is economically tied to indigenous-controlled (mining) corporations, in other cases traditional livelihoods such as reindeer husbandry, hunting and fishing are increasingly competing with industries like mining, forestry or industrial fishing. Moreover, a growing share of opportunities, particularly in the development and energy sectors, come from private enterprises rather than Indigenous-controlled organizations, leaving additional room for exploitation. Climate change adds a further dimension: due to the melting of permafrost, there could be displacement of local communities. Displaced individuals often move towards industrial centres, where unfamiliar environments, weak social ties and dependence on wage labour increase their vulnerability to exploitation and trafficking. Assuming that the industrial development growth rate from 1940-1990 is sustained, approximately 50-80% of the Arctic may reach critical levels of human interference by 2050.

The Global Scale of Labour Trafficking

Labour trafficking is not a peripheral problem. It affects an estimated 17.3 million people globally, with typical conditions including abuse, debt bondage and threats. Human trafficking generates approximately $236 billion USD annually and globally – making it one of the world’s most profitable criminal enterprises.

The Arctic may appear geographically remote, but it is precisely its isolation and institutional under-capacity that could make it attractive to trafficking networks. These structural conditions provide the foundational basis for trafficking networks to develop.

Technology Rationale: Why Polar-Orbiting LEO Satellites?

One answer to solve the structural issues that remote work sites and lack of oversight pose is the usage of satellites for surveillance. Yet, not all satellite systems are equally suited to Arctic surveillance. Geostationary

satellites orbit the earth at high altitudes and are stationary – they cannot cover the Arctic region reliably. Low Earth Orbit (LEO) satellites by contrast, orbit from pole to pole at lower altitudes and can cover high-latitude and remote areas, inaccessible to geostationary systems. They can even pass the same area multiple times a day due to their high speed, allowing them to monitor short-term movements such as convoys.

Equipped with Synthetic Aperture Radar (SAR) and optical sensors, LEO satellites can function even in Arctic darkness and cloud cover. The spatial resolution capabilities of satellites are advancing rapidly: while resolution limits in the 1990s were as low as ca 30m, they can now even go below 0,50m.

A further advantage: LEO satellites could be shared with climate institutions observing the Essential Climate Variables (ECVs) in the Arctic, creating synergies between environmental and human rights monitoring.

Use Cases: Satellite Monitoring Already in Action

This technology is not speculative, it is already being implemented successfully in other contexts. The following use cases demonstrate its applicability to the Arctic:

Maritime Fisheries Surveillance

Global Fishing Watch is already using satellite data and AI to detect vessels likely to be involved in forced labour conditions. Ships engaged in human trafficking operations often disable their Automatic Identification Systems (AIS) to avoid detection. When AIS goes dark, analysts and AI systems look for patterns of disappearance and identify high-risk zones using satellite data from Copernicus, Planet Labs, and other providers.

Stanford HAI and Planet Labs: AI-Powered Pattern Recognition

Satellites monitor most places on earth multiple times a day, making it possible to train algorithms with human trafficking and labour exploitation structures in areas where they are known – and then assign them to search for new, previously unknown patterns in areas like the Arctic that human analysts could easily overlook. The Stanford Human Trafficking Data Lab is already testing the combination of satellite imagery with AI to detect forced labour patterns around the globe.

International Justice Mission and MAXAR

The International Justice Mission (IJM) has partnered with the technology company MAXAR, which allows them to track the growth of human trafficking hotspots and spots where people are forced to work as online scammers for example.

University of Nottingham: “Slavery from Space”

In this project, satellite imagery is being used to identify and monitor trafficking hotspots and to map compounds and establishments more likely to be misused for trafficking operations. The project is already being used by many NGOs to fight slavery. A potential cooperation with Vantor (a U.S. spatial intelligence company specializing in satellite-based AI-analytics) and Windward (a global maritime AI company specializing

in predictive intelligence for shipping, trade and risk management) could be helpful to establish a framework as quickly as possible.

Naval Intelligence Experiment: From Detection to Dispatch in 30 Minutes

A recent naval experiment demonstrated the use of Planet Labs electro-optical and ICEYE synthetic aperture radar satellites to capture images of suspicious vessels. The intelligence was then shared with an AI platform to identify the vessels and dispatch maritime patrol vessels. The total time from detection to dispatch was approximately 30 minutes – illustrating the operational viability of real-time satellite-to-response pipelines.

Governance Framework: A Rights-Based Approach

A multi-stakeholder governance structure in a pyramid type is the most effective model to connect the centralized power of institutions with the broad-based power of local communities and law enforcement, so victim-focused responses can be developed, implemented and evaluated in real time and in cooperation with affected communities.

Governments can adopt policies and legislation to incentivize the positive use of technology which counters human trafficking – coordinating the implementation of these technologies in collaboration with the technology sector, financial sector, anti-trafficking NGOs, and experts.

Data protection, ethics and privacy are critical in the successful implementation of monitoring technology: for protecting survivors from potential re-traumatization and exposure to legal, physical and mental risks, as well as countering arguments of surveillance overreach. According to the OHCHR Principles underpinning privacy and the protection of personal data (A/77/196), data privacy is not just a compliance question, it is a human right. This underlines that data protection is not optional for the successful implementation of monitoring technology, it is constitutive.

From Data to Action: Closing the Response Gap

Detection without response is meaningless. A satellite may flag a suspicious vessel, but if the nearest law enforcement unit lacks funding, manpower or jurisdiction clarity, the intelligence dies in a database. The governance framework therefore needs to balance law enforcement capabilities on an equal level with satellite monitoring.

The current situation is concerning. There are only around 2000 military and police personnel working in the Canadian Arctic, with the number of intelligence officers expected to rise in the near future. In Norway, all 12 police districts maintain anti-trafficking units, but experts still report limited investigation capabilities due to limited knowledge and staff changes. The police there are too reliant on the commitment of investigators to combat trafficking than on institutional leadership priorities. It is also a significant problem that relatively low capacities paired with a high workload in many security institutions further complicate the investigations. Criminal Activities do not stop at borders, which is why Arctic Nations need to increase interoperability between systems and

institutions to effectively fight human trafficking and labour exploitation. Vessels linked to human and drug trafficking have already been seen attempting to access Canadian territorial waters.

Effective decision-making cannot stop at traditional borders. Intelligence gathered via satellite can be relayed to centralized command centers for quicker response to emerging threats. Satellite based connectivity can also function as the only viable coordination channel for law enforcement operations, since cellular networks in the Arctic are typically far more limited.

Law enforcement agencies should also invest in capacity building: internet monitoring, cyber patrols, the use of OSINT, social network analysis and automated searching tools to help investigators handle large volumes of data. Additionally, law enforcement agencies and judicial systems need education on what human trafficking is and how it should be prosecuted.

Indigenous Rights and Data Sovereignty

Indigenous communities must be recognized as equal partners in any monitoring framework – not as subjects of surveillance. The rapid expansion of mining activities is raising significant concerns among local communities about the risks to fragile coastal ecosystems and traditional livelihoods.

The results of climate change in the Arctic – inequities, land dispossession and rapid resource extraction, are complexities that also shape future infrastructure investments, shipping and migration patterns, which directly affect human rights implications and the risk of human trafficking and labour exploitation. It is therefore important to implement rights-based infrastructure already at early stages of these investment processes.

Recommendations

Based on the above analysis, the authors propose five concrete recommendations:

In operational terms, these recommendations should be backed by:

Conclusion

The Arctic is undergoing rapid industrial transformation at a moment when its governance capacity remains severely underdeveloped. The intersection of geographic remoteness, growing extractive industries, migrant and seasonal labour and the rights of indigenous communities creates a risk environment that cannot be addressed by conventional monitoring tools alone.

Satellite-based monitoring – when embedded in a rights-based, multi-stakeholder governance framework – offers a scalable, operationally viable response to this challenge. The technology is proven. The use cases exist. What is missing is the political will and institutional architecture to deploy it in the Arctic context.