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Water Security Under Threat: The Modern Risks of Terrorism, Sabotage, and Industrial Accidents

Milos Pavlovic

Background: Evolving Risks of Water Security in the Age of Terrorism and Technological Vulnerability

Water security, once seen primarily as a concern of resource scarcity and environmental management, has become a critical global security issue due to the rise of terrorism, industrial accidents, and cyberattacks. With the increasing interconnectivity of global infrastructure, the vulnerability of water systems—whether from contamination, physical sabotage, or industrial failure—has escalated, exposing societies to both deliberate and accidental hazards ([Gleick, 2006](#)).

This shift toward a broader understanding of water security is closely tied to the growing threat of terrorist organizations targeting critical infrastructure, including dams, water treatment plants, and nuclear facilities. Terrorist groups have become increasingly sophisticated in their strategies, exploiting both physical and cyber vulnerabilities. In the past decade, there have been numerous attacks on critical water infrastructure, ranging from attempts to poison water supplies to large-scale cyberattacks aimed at disrupting water distribution networks ([Tignino, 2023](#)).

Furthermore, the presence of nuclear power plants adds a layer of complexity to water security. Accidents at nuclear facilities, like those in Chernobyl (1986) and Fukushima

Highlights

Groups like ISIS have attempted to poison water supplies, highlighting the potential for large-scale casualties and environmental damage through deliberate attacks.

Digital infrastructure in water management is vulnerable to cyberattacks, as demonstrated by incidents like the 2021 Florida Water Treatment Plant hack, where hackers attempted to alter chemical levels in drinking water.

Industrial accidents, such as the Bhopal disaster, show how chemical spills can cause lasting contamination of water sources.

Diplomatic cooperation, including multilateral agreements, cybersecurity initiatives, and establishing global norms is essential to safeguarding water security on a global scale.

(2011), have shown the catastrophic effects of radioactive contamination on water systems. The use of weapons of mass destruction (WMDs) by terrorist groups or rogue states could cause similar damage, threatening not only local water supplies but also regional and global ecosystems. Industrial accidents and cyber terrorism—where hackers target critical infrastructure to disrupt essential services—pose additional risks, making water security a pressing diplomatic concern.

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In this increasingly complex environment, diplomacy has an essential role to play in fostering international cooperation, developing protective measures, and managing the geopolitical risks associated with water security. Nations that possess nuclear power plants or significant industrial complexes must particularly be attuned to the risks posed by terrorism and industrial accidents, given the potential for these incidents to cause widespread contamination of water sources.

Interconnected Threats to Water Security from Terrorism, Sabotage, and Industrial Accidents

Terrorism and Water Infrastructure: A Growing Target

Water infrastructure has emerged as a high-priority target for terrorist organizations due to its critical importance in sustaining populations and economies. Attacks on water systems can have immediate and severe consequences, disrupting entire regions, crippling economies, and endangering public health. Terrorists have recognized that targeting water infrastructure offers a means to cause maximum disruption with relatively low resource input ([Gleick, 2006](#)).

Poisoning of Water Supplies

In 2014, the Iraqi city of Fallujah experienced an attack by ISIS forces on its water supply, threatening to poison local water systems. Though the attack took a different course after the ISIS forces took the control of the Fallujah Dam, it highlighted the potential devastation of such actions. Attacks of this

nature, when combined with WMDs, have the potential to cause mass casualties and long-term environmental damage.

Sabotage of Dams and Water Treatment Plants

Physical sabotage of dams or water treatment plants is another potential avenue for terrorists. According to Tobias von Lossow, 'For tactical and strategic reasons, water

frequently plays a significant role in violent conflicts and wars. Sensitive components of the water infrastructure, such as treatment plants, piping systems, pumping stations or reservoirs can become targets for military violence and be destroyed' ([Von Lossow, 2016](#)).

Such attacks underscore the

need for international cooperation in safeguarding critical water-related infrastructure.

Threat of Weapons of Mass Destruction and Radioactive Contamination

Countries that possess nuclear power plants, such as the United States, Russia, China, and France, must grapple with the dual risk of accidental nuclear disasters and deliberate acts of terrorism. Nuclear plants require vast amounts of water for cooling purposes, and any disruption—whether accidental or deliberate—could result in a catastrophic release of radioactive material into nearby bodies of water ([Bobrov et al., 2019](#)).

Chernobyl and Fukushima: Lessons from the Past

The Chernobyl disaster in 1986 released large quantities of radioactive material into the environment, contaminating water sources and affecting ecosystems for decades. Similarly, the Fukushima Daiichi nuclear disaster in 2011 resulted in radioactive material leaking into the Pacific Ocean, leading to long-term concerns about the safety of marine life and water supplies. These events highlight the grave consequences of nuclear accidents on water security, and the risks are only compounded in the context of terrorism ([Steinhauser et al., 2013](#)).

Terrorist Use of WMDs

The use of nuclear or radiological weapons, commonly known as 'dirty bombs,' by terrorist groups remains a significant

concern. Such weapons could contaminate vast areas of land and water, leading to long-term uninhabitability and massive environmental damage. Given the strategic importance of water for human survival and economic activities, targeting water systems with WMDs could be a devastating form of asymmetrical warfare.

Industrial Accidents and Water Contamination

In addition to terrorism, industrial accidents pose significant risks to water security. Many countries with nuclear power plants or large industrial complexes must contend with the possibility of accidental contamination. Water sources can become polluted through the accidental release of hazardous materials, chemical spills, or failure of industrial containment systems.

Case Study: Bhopal Disaster and Industrial Contamination

The Bhopal disaster in India (1984) was one of the worst industrial accidents in history, releasing toxic gases and chemicals that not only caused immediate deaths but also polluted the local water systems. While this was not a deliberate attack, the incident demonstrates how industrial accidents can lead to long-lasting water contamination, especially in densely populated regions ([Broughton, 2005](#)).

Cyber Terrorism: The Growing Digital Threat to Water Security

As water infrastructure becomes increasingly digitalized, cyberterrorism presents a new frontier of risk. Hackers targeting water systems through cyberattacks can disrupt water treatment processes, manipulate dam controls, or sabotage water distribution networks ([Lyngaas, 2023](#)).

These types of attacks could have catastrophic consequences, especially in urban areas reliant on uninterrupted water services.

Case Study: Florida Water Treatment Plant Hack (2021)

In February 2021, hackers breached a water treatment plant in Oldsmar, Florida, and attempted to increase the level of sodium hydroxide (a caustic chemical) in the water supply ([US CISA, 2021](#)). Although the attack was thwarted, it demonstrated the vulnerability of critical infrastructure to cyberattacks. Cybersecurity measures for water systems

must therefore be a key focus of diplomatic efforts aimed at enhancing water security.

Nuclear Power Plants and Water Security: The Double-Edged Sword

Nuclear power plants are heavily reliant on water for cooling purposes, and any disruption to this process—whether from terrorist action, sabotage, or natural disaster—could result in catastrophic consequences for water security. Although reported as a being done in a controlled manner, the decision of the Government of Japan to gradually release radioactive water into the ocean over the course of years will not be able to exclude the negative effects the environment would have to go through ([Yonglong et al., 2021](#)).

The Impact of Nuclear Contamination on Water Sources

When observing nuclear power plants as objects affected by the factor of international or non-international armed conflict, terrorism, or cyber terrorism, therefore suffering harm in forms of sabotage, deliberate but usually covert disruption and incidents with the emission of radioactive material into the atmosphere, soil and bodies of water as a consequence, the negative impact on water security could affect not only states but whole regions as well, disabling them from regular function in terms of water security, for very long-lasting periods of time.

Countries that possess nuclear power plants must work together to develop robust security measures, including regular security assessments, enhanced surveillance, and strict cyber security protocols

If a nuclear power plant were to suffer a terrorist attack, the release of radioactive material could contaminate local bodies of water, affecting not only drinking water but also agricultural irrigation systems. The environmental and health impacts of such contamination could last for decades, as seen in the aftermath of both Chernobyl and Fukushima.

Countries that possess nuclear power plants must work together to develop robust security measures, including regular security assessments, enhanced surveillance, and

strict cyber security protocols. Diplomatically, this requires multilateral agreements on the protection of nuclear facilities and the safe handling of radioactive materials.

The Role of Diplomacy in Addressing Water Security Threats

Diplomatic efforts to enhance water security must focus on international cooperation, transparency, and the establishment of global norms for protecting water infrastructure. Nations should prioritize the development of treaties and agreements aimed at safeguarding critical water infrastructure from terrorism, sabotage, and cyberattacks.

International Water Security Agreements

The creation of multilateral agreements on water security, similar to the Paris Agreement on climate change, could help to establish clear standards and protocols for protecting water systems. Such agreements should include mechanisms for sharing intelligence on terrorist threats, conducting joint security assessments, and providing assistance to countries in safeguarding their water infrastructure.

The establishment of global norms, the sharing of technology, and capacity-building initiatives will be essential in ensuring that water remains a secure and sustainable resource for future generations

Technology Sharing and Capacity Building

Wealthier nations, with more advanced cybersecurity and industrial safety protocols, should assist developing countries in strengthening their water infrastructure security. This could involve the transfer of technology, training programs for cybersecurity personnel, and funding for infrastructure improvements.

Addressing the Geopolitical Dimensions of Water Security

Water security is not only a technical or security issue but also a geopolitical one. Many regions, including the Middle East, Central Asia, and parts of Africa, experience tensions over transboundary water sources. Diplomatic efforts to resolve these disputes should include provisions for protecting shared water resources from terrorist attacks and

industrial accidents, ensuring that water remains a source of cooperation rather than conflict.

Conclusion: Diplomacy's Role in Navigating the Complex Terrain of Water Security

The modern threats to water security are complex and multifaceted, ranging from terrorism and sabotage to industrial accidents and cyberattacks. As global water systems become more interconnected and reliant on digital infrastructure, the potential for deliberate or accidental disruption grows, posing significant risks to human health, economies, and regional stability.

Diplomacy must play a central role in addressing these threats by fostering international cooperation, developing protective frameworks, and enhancing the security of critical water infrastructure.

Although chemical stocks, chemical production, processing facilities and transport routes of chemicals in the presence of bodies of water present a high risk of potential contamination, due to many disrupting and mostly hostile factors, there

still are adequate ways of technological responses to those cases and ways of remediation of water. The nuclear (radioactive) contamination of bodies of water presents a greater threat. Countries with nuclear power plants, in particular the countries where the regions are at direct

or indirect risk of existing and/ or potential armed conflicts, like Ukraine and the countries of eastern and southeastern Europe, must be vigilant in protecting their water resources from the dual risks of accidental contamination and terrorist attacks.

The establishment of global norms, the sharing of technology, and capacity-building initiatives will be essential in ensuring that water remains a secure and sustainable resource for future generations.

As the world grapples with these emerging challenges, it is clear that water security cannot be separated from broader discussions of national and international security. Governments, international organizations, and civil society must work together to ensure that water systems are protected from the growing threats posed by terrorism, sabotage, and industrial failure.

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EDITORIAL INFORMATION

About the Authors:

Milos Pavlovic, M.Sc., is a former military officer with expertise in international civil-military cooperation, security risk management, and strategic crisis diplomacy. His work focuses on the intersection of security and diplomacy, particularly in the context of global infrastructure and environmental protection.

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