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Viewpoint

Forging Resilience in a Fractured World: Science Diplomacy for Energy, Food, and Water Security

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NAVIGATING GLOBAL DISRUPTIONS FOR CLIMATE RESILIENCE

Here in 2025, we are living in a time of extraordinary disruption. A confluence of forces, including climate variability, population growth, technological shifts, and geopolitical tensions is reshaping global societies and challenging the capacity of institutions to address urgent, interconnected problems. For those of us in research and higher education, this era is marked by a worrying decline in trust in experts and deep societal divisions that challenge the very social license of our institutions. These existential disruptions are not abstract; they directly threaten our collective ability to address the urgent, interconnected challenges of energy, food, and water sustainability, which form the bedrock of climate resilience. These interconnections make building climate resilience increasingly complex, demanding integrated solutions informed by robust evidence and cross-sectoral collaboration.[1]

In this volatile landscape, we argue for the application of science diplomacy as a mitigation. Science Diplomacy is the use of scientific collaboration to advance diplomatic objectives and solve shared problems. This emerges not as a lofty ideal, but as an essential tool for survival and progress. Yet, this vital tool is itself at risk and has long been framed as a tool to transcend political divides.[2]

AN OUTDATED BLUEPRINT FOR A NEW REALITY

For years, the discourse around science diplomacy has been optimiztic. The landmark 2010 report from the American Association for the Advancement of Science (AAAS) and the Royal Society, *New Frontiers in Science Diplomacy*,[3] framed it as a powerful mechanism for building bridges and serving the common good. It championed international scientific cooperation as the primary means to transcend political divides and tackle global challenges, aligning perfectly with the collaborative spirit of the UN Sustainable Development Goals.

This framework to us, however, feels increasingly tied to a bygone era of cooperation. Fifteen years on, the geopolitical context is more adversarial. Scientific progress is outpacing regulation, the balance between openness and security has become precarious, and global powers are retreating from collaboration toward competition. Geopolitical competition has intensified, scientific progress increasingly outpaces regulatory frameworks, and trust in experts is fragile. These changes have exposed the limitations of the traditional, cooperation-centric model of science diplomacy, particularly when the legitimacy of science itself is contested.[4,5] As a new joint report, Science Diplomacy in an Era of Disruption, makes clear, we need a more pragmatic framework that acknowledges today's realities.

This updated view rightly reframes science diplomacy as a tool used by nations and organizations to achieve specific objectives—which can be cooperative or competitive. It recognizes the expanding landscape of actors, including industry, and highlights the unavoidable tensions between collaboration and national security. It shifts the focus from the

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theoretical to the practical: how science impacts diplomacy, and vice versa.

THE CORE CHALLENGE IS SCIENCE ITSELF IS UNDER ATTACK!!

The greatest threat to science diplomacy, however, is not a flaw in its framework but an attack on its foundation: science itself. How can we deploy science to resolve disagreements on climate change or resource management when the legitimacy of global scientific institutions is being actively undermined by national actors?

Consider the recent developments concerning the Intergovernmental Panel on Climate Change (IPCC).[1] For decades, the IPCC has been the gold standard, providing the evidence-based consensus that underpins global climate negotiations like the Paris Agreement. Yet, the United States, a historic leader in science, has recently signaled a pullback from this crucial body. When a key member of the international community refuses to fully engage with the shared scientific process for addressing a global crisis, it poses a direct and profound challenge to science diplomacy. It erodes the very premise that evidence can unite us in action. This directly imperils progress on SDG 13 (Climate Action), as well as the related goals for SDG 7 (Affordable and Clean Energy), SDG 2 (Zero Hunger), and SDG 6 (Clean Water and Sanitation) (UN, 2020).[6]

FROM THE LAB BENCH TO THE POLICY TABLE?

So, how do we practice science diplomacy when science is contested? An alternative approach, outlined in a recent European Union report, suggests moving science from the fringe to the core of foreign and security policy.[7] This is not a comfortable proposition for many researchers, who are more accustomed to providing advisory evidence from an arm's length.

However, in an era where evidence is politicized and trust is fragile, that distance is a luxury we can no longer afford. Researchers working on the front lines of energy, food, and water sustainability must be in the room when critical decisions are made. Their presence can help safeguard the integrity of the scientific process against political interference and budget cuts. This requires a fundamental shift. One of the greatest weaknesses in the current approach is the assumption that diplomats and policymakers share a common understanding of the need for scientific independence. As recent events show, this cannot be taken for granted. The first step toward protecting science diplomacy must be to protect science itself, potentially by enshrining the operational independence of researchers and scientific bodies into law.[5]

As we seek submissions on global challenges in sustainability, we urge contributors to look beyond purely technical solutions. We need research that grapples with this new, disruptive geopolitical context. We need scholars and practitioners to explore how their work can inform a more resilient and realistic science diplomacy—one that not only advances knowledge but also actively defends the principles of evidence and collaboration. Forging partnerships for the goals (SDG 17) is more critical than ever, but it begins with a shared commitment to protecting the integrity of science as our most crucial common language.

To address these challenges, we propose a reimagined, pragmatic conceptual representation for science diplomacy, with EFW as a nexus (Figure 1). This conceptual representation rests

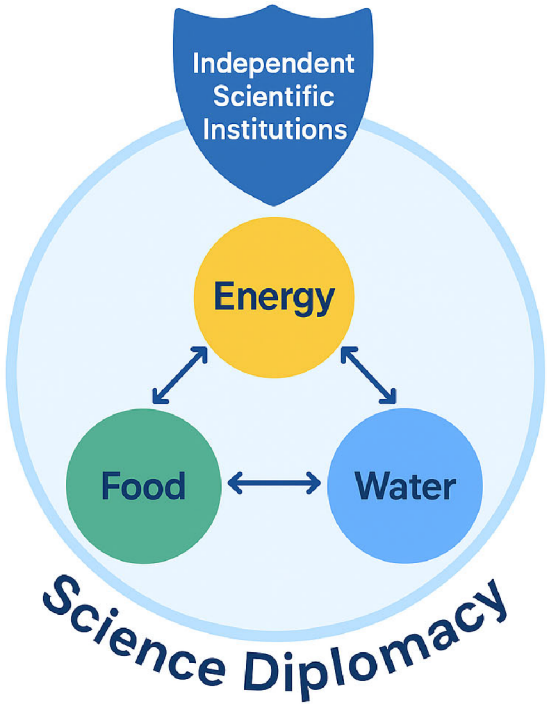

Figure 1. Conceptual representation of the energy−food−water (EFW) nexus and the role of science diplomacy in facilitating integrated, evidence-informed decision-making, with independent scientific institutions providing credibility and resilience to the process.

on two interdependent principles: first, embedding scientific expertise directly into policy and diplomatic processes so that evidence informs decisions at all levels; and second, proactively protecting the independence and integrity of scientific institutions, ensuring they remain credible and resilient in the face of political pressures.[7,8] The EFW nexus provides a compelling test case. Its complexity spans sectors and borders, and decisions in one domain can ripple across systems. Science diplomacy can facilitate negotiation of trade-offs, codevelopment of solutions, and alignment of objectives among stakeholders. Collaborative platforms that bring together researchers, policymakers, and practitioners enable dialogue on shared resources such as energy grids, water systems, and food supply chains, promoting solutions that are both evidence-informed and context-sensitive.[9]

Indeed, there are practical examples that highlights the potential and pitfalls of science diplomacy. Initiatives that structure cross-sector and cross-border collaboration, whether in transboundary water management, energy infrastructure coordination, or food systems planning, demonstrate that scientific engagement can provide neutral, evidence-based pathways for cooperation even amid political or economic tensions. At the same time, the credibility of these efforts depends on protecting the operational independence of scientists and institutions, creating safeguards that maintain trust in evidence even when decision-making is contested.[10]

Importantly, science diplomacy must also evolve to address structural inequities in knowledge production and representation. Traditional models often privilege well-resourced actors and countries, potentially sidelining local knowledge or smaller stakeholders whose perspectives are critical for sustainable solutions. Inclusive, participatory approaches ensure that

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scientific advice reflects diverse realities and that solutions are equitable, enhancing legitimacy and effectiveness.

FINAL THOUGHTS

Integrating scientists into policy processes is not merely advisory but it is strategic. In an era of contested evidence and fragile trust, the presence of credible expertise in decision-making forums can help safeguard the integrity of research, prevent politicization, and maintain continuity of knowledge generation. Networks of scientific institutions and research consortia play a critical role in this regard, providing platforms that support both collaboration and autonomy, and fostering resilience in global knowledge systems.[4,7]

To conclude, the EFW nexus illustrates why science diplomacy must adapt. Its interconnections demand integrated solutions, and its global implications require cooperation across sectors and borders. By interweaving scientific expertise directly into policy, protecting the independence of institutions, and promoting inclusive collaboration, science diplomacy can strengthen evidence-informed decision-making, advance sustainability goals, and build resilience against disruption.[11] The time to evolve the practice of science diplomacy is now; ensuring that science remains both a trusted and actionable tool is essential for addressing the intertwined challenges of energy, food, and water security in a troubled, volatile world.

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Notes

The authors declare no competing financial interest.

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Dr. Natisha Dukhi is a dynamic public health scientist whose interdisciplinary research bridges science, leadership, advocacy, and sustainable development. She holds a Ph.D. in public health and brings more than a decade of experience as a medical scientist, lecturer, and researcher with a strong record of addressing complex health challenges across Africa and globally. Her expertise spans nutrition, child and adolescent health, noncommunicable diseases (NCDs), mobile health (mHealth), and science diplomacy, critical areas for advancing health equity and resilience. As a Senior Research Specialist at the Human Sciences Research Council, she leads and/or contributes to several large-scale, multistakeholder projects. As a prolific scientist, and mentor, science diplomacy and advocacy are reflected in her roles as a member of the South African Young Academy of Science and Global Young Academy and the International Science Council's (ISC) Global Roster of Experts. Dr. Dukhi is a thought leader in public health, contributing actively to national and international platforms. She is committed to advancing inclusive, transformative, and sustainable science that strengthens health systems globally. With numerous peer-reviewed publications and the prestigious Gro Brundtland Award, her work continues to shape policy and empower the next generation of African scientists and beyond.

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