SCIENCE DIPLOMACY: A SOUTH AFRICAN PERSPECTIVE

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Abstract

Science diplomacy has gained popularity since 2009 and plays an important role in connecting scientific knowledge generated from various disciplines to strengthen global scientific cooperation. Many challenges necessitate global collaboration. These include climate change, the threat to loss of biodiversity, artificial intelligence advancements and its societal implications, food security, air pollution and health, water and sanitation related issues, just energy transition and geopolitical crises to name but a few. While scientists generate the knowledge and publish their findings to share with the scientific community, ambassadors of science representing their countries engage with their counterparts to establish collaborations across political boundaries. National academies have an important role to play in this regard as they have the power to convene academics, policymakers, the business sector as well as the public in dialogue on issues of national and global importance. The Academy of Science of South Africa (ASSAf) plays a vital role in addressing national, regional and global challenges in collaboration with other Academies on the continent and elsewhere. Some examples of how ASSAf uses science diplomacy to engage on issues of global importance are addressed in this paper.

Keywords

Academy of Science of South Africa (ASSAf), Geopolitical Crisis, Climate Change, Science under Threat, COVID Pandemic

Introduction

Scientific research and discoveries happen at various levels. It begins with an idea conceived by an individual or a team, and then gains momentum by establishing goals and objectives. Funding is critical for this research to succeed, bringing in additional actors, namely, funders. Often the research involves collaboration with researchers from within the country based at other institutions or international researchers from different countries cooperating on a specific project or field. One of the goals of research-driven science is to publish the knowledge gained through research in scientific journals bringing in another actor – the publisher. For years, this curiosity-driven science has seen a good working relationship between the various role players from the researchers, and their academic institutions, to collaborators, funders and publishers. Each role player sets rules of engagement for a good, effective working relationship with different targets and indicators, with the ambition that research will address the needs and advancement of society.

Over the years, collaborative research has driven science, technology, and innovation nationally and internationally resulting in the sharing of resources and expertise, open communication, and data sharing. We have witnessed breakthroughs in many fields of science - quantum technology, artificial intelligence, space research, and biotechnology to name but a few, while global challenges like climate change, pandemics, and biodiversity loss have demanded unified global action.

National academies have a significant role in this discourse. Academies bring the perspective and insights of scientists in academia and play a crucial role in promoting engagements between academics, policymakers, the business sector and the public.

In South Africa, the Academy of Science of South Africa (ASSAf), which is the only national academy, was established by Parliament in 2001 (Act, *No 67 of 2001)* with former late President Nelson Mandela as its chief patron. ASSAf became fully operational in 2006 and has since effectively delivered on its mandate to promote and inspire outstanding achievements in all fields of scientific inquiry and to grant recognition for excellence, and proactively, or upon request, conduct studies on matters of public interest to provide evidence-based scientific advice to government and other stakeholders.

As an influential entity in both the local and international scientific arena, ASSAf employs its status as an independent, non-biased and credible organisation to engage on global issues of concern using evidence-based science through collaboration. The application of science, technology and innovation to address global challenges and foster international cooperation has recently been advanced through the concept of “science diplomacy”.

Understanding Science Diplomacy

Science diplomacy has emerged as a new policy concept interconnecting science, technology, and innovation with international relations (The Royal Society & AAAS, 2025). While the role of scientists is to discover new knowledge about the world, and sometimes to apply this knowledge for the benefit of humanity, the role of diplomats is

seen to represent and serve the interests of their country, company, or multilateral institution. Science diplomacy is used to promote science through the interactions of scientists and diplomats.

The "New Frontiers in Science Diplomacy" report by the American Association for the Advancement of Science (AAAS) and the Royal Society (2010) suggested a taxonomy for science diplomacy that has been adopted by many countries. The first aspect, *science in diplomacy*, refers to science providing advice to inform and support foreign policy objectives. This dimension of science diplomacy focuses on the role of individual expert advisers or scientific organisations, for example national academies, in informing policymaking, as well as other means of providing scientific advice to global policymakers, such as through rigorous evidence syntheses.

The second, *diplomacy for science*, refers to diplomacy that facilitates international scientific cooperation. The diplomacy for science dimension was defined as the promotion of international cooperation both at the 'top-down' strategic level, and at the 'bottom-up' level of collaborations involving individual scientists.

The third dimension, *science for diplomacy*, refers to the use of scientific cooperation to improve international relations among countries. This dimension includes science cooperation agreements and scientific facilities established with the objective of enhancing relations between countries.

Collectively, science diplomacy serves as a bridge connecting scientific knowledge to strengthen global scientific cooperation in an evolving global landscape.

The Role of ASSAf in Addressing Global Challenges through Science Diplomacy

In addition to activities linked to national priorities as outlined in the *White Paper for Science, Technology and Innovation* (DSTI, 2019) and the *Science, Technology and Innovation Decadal Plan 2022-2032* (DSTI, 2024) and other South African policy frameworks, ASSAf plays a pivotal role in representing South Africa at international platforms such as the BRICS Academies, the Science20 (S20) group, the InterAcademy Partnership (IAP), The World Academy of Sciences (TWAS), the Network of African Science Academies (NASAC), Organization of Women in Science in the Developing World (OWSD), while also engaging with national academies globally. These partnerships provide opportunities for dialogue and engagement for collaborations when addressing global challenges.

Given that many of the global challenges are interlinked, ASSAf adopted the term 'polycrises' to explain how, "present and future risks may interact to create a 'polycrisis' – a cluster of interrelated global risks with compounding effects, such that the overall impact exceeds the sum of each part" (World Economic Forum, 2019). These multifaceted challenges encompass the economic, health, and political spheres that have ripple effects on environmental sustainability.

Globally, one notable impact is the exacerbation of air pollution, particularly in rapidly industrialising nations. Research underscores the correlation between air pollution and adverse health outcomes, emphasising the need for stringent measures to address this critical environmental concern (Fuller et al., 2022). Increased pressure on natural habitats, as economic uncertainties and resource reallocations, may contribute to habitat loss and displacement. Recent studies have highlighted the necessity for conservation initiatives that recognise the complex interplay between ecological resilience and socio-economic factors (Dorninger et al., 2024).

Climate change is a critical global issue with dire consequences and repercussions for agriculture, water resources, the ocean economy, and extreme weather events. Studies underscore the vulnerability of many countries to climate change and the urgency of implementing adaptive strategies (Lee & Romero, 2023). Deforestation, often driven by agricultural expansion and logging, remains a significant threat to biodiversity and contributes to carbon emissions. Forest conservation is crucial for maintaining ecological balance and mitigating climate change (Nepstad et al., 2014).

Water scarcity, exacerbated by rapid urbanisation and industrial expansion, is a critical environmental challenge in South Africa and other countries. Sustainable water management practices and policies are essential for addressing this issue (ASSAf, 2023b). Additionally, the polycrisis has led to increased scrutiny of environmental policies and conservation efforts as nations contend with conflicting priorities (Ellis, 2024). Comprehensive strategies that consider the interconnectedness of health, environmental, economic, and social factors are imperative for sustainable development in the face of the ongoing polycrisis.

The disruption caused by the polycrisis has also influenced patterns of resource utilisation globally. Economic challenges and shifts in production dynamics alter the demand for natural resources, negatively impacting ecosystems and biodiversity. This may lead to overexploitation of specific species, changes in land use patterns, and increased pollution, further stressing ecological systems. Preserving ecological integrity in the face of the polycrisis requires a nuanced understanding of the socio-economic drivers influencing resource use and ecological impacts (Jørgensen et al., 2023). Conserving and restoring ecosystems, coupled with sustainable resource management practices, become imperative for the resilience of countries' ecologies amid the ongoing complex crises.

In terms of the just energy transition, South Africa, like other countries, faces unique challenges in balancing economic growth with environmental sustainability. One notable impact is the increased complexity in achieving a just energy transition, wherein the transition to cleaner and more sustainable energy sources must account for social equity. The economic disruptions and resource reallocations resulting from the polycrisis may potentially impede progress toward renewable energy adoption and hinder the implementation of policies that promote social justice in energy access (ASSAf, 2023a).

ASSAf embraced the opportunity of hosting the BRICS Member States in December 2023 during the BRICS Academies Forum to highlight these global challenges under the theme

of "Polycrises and Developmental Challenges". Furthermore, in February 2025, ASSAf hosted the Academies within the G20 Member States to deliberate on matters related to "Climate change and Well-being". These engagements provided platforms for science engagement and dialogue on contemporary global challenges. Despite elevated geopolitical tensions, the engagements were collegial, respectful and focused on science and steered clear of sensitive political issues.

Many of the issues discussed above contribute to the ongoing activities within ASSAf on addressing the Sustainable Development Goals (SDGs). ASSAf has hosted webinars, workshops and engaged with other stakeholders and national academies on many objectives related to the SDGs.

COVID-19 Pandemic and Vaccine Inequity

ASSAf Members played a key role and contributed significantly by wearing their academic hats on various governmental committees set up to mitigate against the virus. In addition, they played a seminal role in science engagement and communication during the height of the pandemic and subsequently shared their experiences at various forums that resulted in reports on lessons learnt to strengthen and ensure readiness in the event of another national disaster (Presidency of South Africa, 2021).

ASSAf hosted and collaborated with many stakeholders and academies on multiple occasions to discuss the pandemic, with South African academics playing an active role in describing variants of the virus and the epidemiology of the COVID-19 pandemic (Viana et al., 2022). Vaccination availability played an important role in the fight against COVID-19. An area that required science diplomacy related to the process of vaccine acquisition and distribution, particularly in low- and middle-income countries (LMCs) (Haldane et al., 2023). Despite numerous international discussions on the issues, we still witnessed the prioritisation distribution of the vaccine rollout in G7 countries and the inequitable distribution to LMCs. The COVID-19 pandemic remains a global threat and inequalities in access to health and vaccination could allow new COVID-19 lethal variants to emerge and spread rapidly.

Science Diplomacy during Times of Geopolitical Challenges

Geopolitics has become a complex mix of events fuelled by exogenous factors that result in varying degrees of thematically related risks. This complexity poses a heightened risk to the global economy, with the potential of leading to more frequent geopolitical-linked risks in the coming decade. Geopolitical tensions, including the ongoing Russia-Ukraine war, the crisis in Sudan, the Israel-Hamas conflict, India-Pakistan crisis, and other regions where conflict issues prevail, have had a domino effect on multiple global systems, leading to synchronised crises.

ASSAf notes with deep concern the devastating and profound impact that war and armed conflict have on humanity and the environment, which have included high levels of reported war crimes, violations of human rights, and infringement of international humanitarian law. Such conflicts lead to humanitarian devastation, fatalities, injuries,

damage to critical infrastructure and the environment, forced population displacement, the proliferation of disease, hunger and malnutrition, with the civilian population and younger generations often as unprotected victims (ICRC, 2014).

Armed conflict has a direct impact on the advancement of science. It has destroyed schools, universities and research facilities, the displacement and killing of scientists, teachers and students, the suppression of critical dissenting voices, and the forfeiture of invaluable research, knowledge, expertise and the disruption of and damage to these institutions. The destruction of libraries and laboratories during periods of conflict irreversibly destroys locally produced knowledge, print material and archives. Long-term consequences for scientific progress include setbacks in critical domains central to human development, such as healthcare, education, environmental sustainability, and technological advancement.

Science is inherently global, with scientists collaborating across geopolitical divides. In periods of war and armed conflict, this engagement is jeopardised, along with the advancement of science. Armed conflict undermines collaboration, isolating scientists and impeding the flow of knowledge. Furthermore, the destruction of institutions and displacement of scientists, teachers and students not only depletes the intellectual resources available in conflict affected areas but also intensifies global inequalities in scientific and educational capability. Consequently, knowledge loss becomes one of the lasting consequences for societies in conflict.

ASSAf unequivocally condemns all violations of international human rights and international humanitarian law. ASSAf, as an association representing scientists, implores governments and leaders of international agencies and civil society to call for the protection of institutions and scientists and their communities in conflict areas, and to work towards the peaceful resolution of conflicts. ASSAf believes it has a role to play in this respect and remains strongly committed to dialogue and debate, in support of its members in exercising their academic freedom as scientists and teachers.

Science under Threat – The Impact of Budget Cuts from the USA

In January 2025, scientists globally recoiled as news of the 90-day shutdown of the United States (US) Agency for International Development (USAID) by the US President Donald Trump's administration. This directive was accompanied by the news that all USAID directly hired personnel were being placed on administrative leave globally (Dhai, 2025). Instead of waiting out the 90 days, by 27 February recipients of funding from the US President's Emergency Plan for AIDS Relief (PEPFAR)-funded HIV organisations in the country received communication that their grants had been permanently terminated because they were not aligned with USAID priorities, and that their programmes were not in the US national interest. They were told to immediately cease all operations and terminate all subawards and contracts (Malan, 2025).

Dhai (2025) further emphasised that while considerable focus in the country has been on the PEPFAR programme, health research has been negatively impacted as well. Furthermore, globally, many research efforts have been adversely affected by

Trump's actions. The South African Medical Research Council (SAMRC) receives about one-third of its funding from US federal sources, mostly for HIV and tuberculosis research, but also for other areas, including maternal and infant mortality and antibiotic resistance (Ntusi, 2025).

South Africa has ~8 million people living with HIV, i.e. the largest population with the virus globally. It is therefore not surprising that the country is a hub for research on the virus. While most of the landmark and groundbreaking studies have been conducted in South Africa, the benefits of the research have been reaped globally. The African-led BRILLIANT study, aiming to develop capacity to produce vaccines on the continent, is funded entirely by a USD45-million grant from USAID (Dhai, 2025). The CEO of the SAMRC is pessimistic that funding for the study will resume. Hence, the vaccines that are ready for clinical trials will probably remain in storage (Ntusi, 2025). Besides HIV and tuberculosis, studies on other infectious diseases, gender-based violence, health systems strengthening and disease-burden monitoring are also affected by the funding cuts, which have major repercussions on staffing as well (Dhai, 2025). Universities are also impacted, with budget cuts and termination of programmes are being felt across a range of research and academic sites. With the shutdown of such programmes, research participants in clinical trials are deprived of further interventions, creating a cascade of downward spirals in monitoring these participants for adverse events and in access and management of their health.

In the USA, federal agencies such as the National Institutes of Health (NIH) and National Science Foundation (NSF) are critical sources of funding for basic and applied scientific research. Recently, many of these agencies have seen their research operations frozen or downsized as part of retrenchments imposed by the Department of Government Efficiency and the Trump administration's broader agenda (Garcia et al., 2025). More recently, we learnt that all NIH subcontracts have been terminated, and this has dire consequences on ongoing collaborative studies in all fields of science (Copelyn, 2025). Several South African researchers and programmes that were facilitated with USA funds have been terminated.

ASSAf, together with other academic institutions and stakeholders, hosted national dialogues locally to understand the impact of these budget cuts. The first webinar hosted by ASSAf in March 2025, entitled "*Understanding the implications of financial cuts from the USA on research in South Africa*", heard contributions from leading academics in the biomedical field. A subsequent webinar in April 2025 entitled "*Science, leadership and ethics in times of geopolitical crises*" featuring academics from the social sciences and humanities as well as an ethicist. These engagements were received positively by the South African research community, and many suggested that ASSAf should be one of the voices to engage with the South African government around these issues. ASSAf followed up on this by issuing a Statement "*Science under threat*" on 30 April 2025 (ASSAf, 2025),

The science community in South Africa faces a time of extreme crisis. This crisis has been precipitated by the multiple actions engaged by the current US administration with respect to science, scientists, and the scientific enterprise.

The most immediate impact of the administration's barrage of policy initiatives and related actions is a severe reduction in (and even elimination of) funding, personnel and training affecting key institutions which support and enable scientific research, development and innovation in South Africa.

While the scale of the cuts in US funding is more readily evident in the biomedical sciences, and in HIV/AIDS research and treatment studies, we hold that these financial cutbacks pose significant threats to the academy, with effects on all disciplines.

First, the reduction in funding across several domains of scientific activity undermines active and longstanding collaboration between South African and US scientists engaged at the frontiers of science. The inestimable value of such partnerships was evident in the field of infectious diseases during the recent COVID pandemic; the identification at the time of the omicron variant by African scientists in South Africa and Botswana, exemplifies this.

Second, the research and development infrastructure that underpins and enables such productive partnerships in the sciences, and the trust among scientists, have been painstakingly built over decades and now threatens to unravel with the loss of funding that sustained mutually beneficial scientific activities.

Third, the regular exchange of scholars and scientists between South Africa and the US has been crucial in joint research and development projects; such exchanges have also benefitted postgraduate students from both sides of the Atlantic who were able to refine their skills and understandings in the top seminar rooms and laboratories of both countries. Those fertile and frequent exchanges are now under threat because of funding cuts and stricter visa controls that have already affected international students studying in the US as well as visiting professors.

Fourth, the threat to academic values is significant and cannot be overstated. In both countries, universities place a high premium on values such as academic freedom, equity, trust, integrity and the right to dissent. One of those key values that matter in the academic community in times like these is solidarity, and it is our role as an Academy, and of our government, to take a public stand with our colleagues in the US.

In light of South Africa's bitter experience of assaults on academic freedom and freedom of expression in the apartheid era and post-apartheid, the Constitution of South Africa enshrines robust protection for each of these values, understanding them to be as central to the success of deliberative democracy as they are to scientific advancement.

We urge the South African government to:

1. Publicly affirm the defence of these constitutional values in the current moment of crisis as it affects science, scientists and the scientific enterprise in South Africa.
2. Provide governmental funding, including actively facilitating funding from other multi- and bi-lateral sources, in those critical areas where scientific research, development and exchange is being negatively affected by the actions of the US administration.

3. Engage the Academy and its Membership and other entities on ways in which a productive and sustained response to this crisis in our scientific community can be developed and sustained (ASSAf, 2025).

Independently, the Minister of the Department of Science, Technology and Innovation (DSTI), Dr Blade Nzimande, has appointed a committee to investigate the impact on its research programmes following the US-imposed budget cuts (DSTI, 2025). The ASSAf President, Prof Thokozani Majozi, has received an invitation to serve on this committee. We look forward to hearing more from the DSTI and other government departments on South African strategies to address this threat to science going forward.

Conclusion

Science diplomacy plays a crucial role in influencing the future by fostering international cooperation and addressing global challenges, particularly in areas like climate change, health, and sustainable development. It leverages scientific expertise to inform policy decisions, promote peace and security, and foster collaboration among nations. However, the effectiveness of science diplomacy at the global level faces challenges, including a need for improved multilateral systems and addressing scepticism towards scientific findings.

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