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A Diplomatic Conduit: The Role of Science Diplomacy in Africa

Lesley Masters

Introduction

Advancements in science, technology and innovation (STI) saw significant development in countries at the centre of the first industrial revolution of the 18th century. This transformed national social, political and economic environments, but also led to a widening gap between developed and developing countries in the structure of the world system. Those countries on the margins of the industrial revolution continue to find themselves relegated to the periphery in the global structure. Yet in a world where the challenges facing humanity are transnational, all countries, as well as the growing networks of non-state actors, play a role in their resolution. In the 21st century, efforts to address concerns such as climate change, the global COVID-19 pandemic and cyber security need a global partnership. This is a point advanced by the United Nations (UN) Sustainable Development Goal (SDG) 17. The challenge is the gap in access and capacity in STI has driven both cooperation and competition as countries, intergovernmental organizations and non-state actors seek to ensure a voice in decision making.

Communication, negotiation and representation are central to the practice of diplomacy and integral in facilitating global engagement and cooperation (Bjola and Kornprobst, 2013). With the gap between STI 'haves' and 'have nots' growing, the role of 'diplomacy for science', 'science for diplomacy' and 'science in diplomacy' as a means of creating global partnerships is coming to the fore (AAAS/RS, 2010; Rao, 2018; Turekian, 2018; Jacobsen and Olšáková, 2020). Technological advances frequently move faster than politics. For example, progress in artificial intelligence has far outpaced the debates around its governance, accessibility, impact on economies, or international security. On other issues, such as the climate change negotiations, science has provided the foundation for what needs to be achieved in terms of emission reductions, but it is the politics that frequently presents an obstacle to reaching a comprehensive and binding agreement. In the case of the global outbreak of the COVID-19 pandemic in 2019, the delays in coordinated action, vaccine nationalization and the global inequality in access to life-saving medicines patently points to the need for greater engagement in science diplomacy in facilitating cooperation. The value of science diplomacy is that it highlights both the political and scientific pillars of diplomatic engagement.

While the understanding of science diplomacy continues to evolve, its application in statecraft needs further analysis. The political nature of science diplomacy means that it is more than activities of scientific cooperation, where cooperation itself can create 'winners' and 'losers' in the race to address global challenges leading to further structural divisions. In the main, the literature uncritically claims science diplomacy as a panacea for building mutually positive relations between parties; yet, given the global international structure, this is often a one-sided affair dominated by those with a developed capacity in science diplomacy. This exploratory study begins by addressing the concept of science diplomacy, its political purpose and its place as a tool in the diplomatic toolbox. The chapter then considers the role of science diplomacy in the African context and in facilitating communication, negotiation and representation. This aims to move discussions away from addressing the meaning of the concept of science diplomacy to considering questions of capacity, application and its role in practice.

Developments in science diplomacy: where is Africa?

Addressing Africa's peripheral position in the global knowledge structure requires effective science diplomacy (Masters, 2021), yet there is little discussion from Africa, and with Africa, on the concept's meaning and its development. What science diplomacy is, or perhaps more importantly how is it understood, has been the focus of discussion from the late 2000s. This includes a burgeoning literature considering science diplomacy's historical development (Turekian, 2018; Adamson and Lalli, 2021: 1), regional and country application (Rüffin, 2020), and issue-specific analysis – for example on science diplomacy and climate change, the oceans and the role of women in science diplomacy (Doğan et al, 2021).

Discussions on science diplomacy frequently refer to the conceptual understanding espoused in 2010 by the American Association for the Advancement of Science (AAAS)/Royal Society, based in the US and the UK respectively. This includes science diplomacy as 'informing foreign policy objectives with scientific advice (science in diplomacy); facilitating international science cooperation (diplomacy for science); using science cooperation to improve international relations between countries (science for diplomacy)' (AAAS/RS, 2010: v–vi). While this does provide a framework for defining science diplomacy, it has also been critiqued for missing the idea of 'diplomacy in science', as well as failing to account for the multifunctional nature of science diplomacy and the structural nature and impact of knowledge (Adamson and Lalli, 2021). In other words, science diplomacy is frequently understood through a developed-country perspective. This is a point highlighted by Doğan et al (2021) in their discussion of the liberal and realist understanding of science diplomacy, along with the study by Adamson and Lalli (2021: 3), who point to the 'great weight the Anglo-Saxon view has had up to this point in determining how we study science diplomacy'. This certainly calls for the further interrogation of science diplomacy from alternative perspectives.

It is not just the concept of science diplomacy that has an Anglo-Saxon flavour, but its practice. Given the geographical position of the industrial revolution, it is perhaps unsurprising that one of the earliest records of a diplomatic engagement on science is from the 19th century, when the US sent a science attaché to Germany (Linkov et al, 2014). What distinguishes science diplomacy from scientific cooperation is its political considerations, reflecting the interests and priorities of countries (Jacobson and Olšáková, 2020: 471; Doğan et al, 2020: 33). This political consideration was evident in the cold war, when science diplomacy was seen as a means for advancing cooperation in promoting countries' national interests on questions of security and development. One of the significant scientific projects that took place during this period was the 1957–58 International Geophysical Year (IGY), which saw cooperation across 67 states to demonstrate that 'scientific cooperation could transcend political tensions and national boundaries' (Committee for Survey and Analysis of Science Advice on Sustainable Development to International Organizations, 2002: 5). This was hailed as a period of 'highly effective use of science diplomacy to build bridges and connection despite the existence of great political tensions' (Turekian and Neureiter, 2012: 26). While science diplomacy was gaining ground through these interactions, not all nations were able to participate, and not all participated equally given that many of the countries from Africa were newly independent or yet to decolonize. This was a point made evident in the signing of the Antarctic Treaty of 1959, where just 12 countries participated (Van Langenhove, 2019: 18), the only African country present was South Africa, then led by the apartheid National Party.

Science diplomacy as a conduit for communication and cooperation has continued as a means of engagement for developed countries. For instance, the US continues to engage in science diplomacy with countries with which it has strained or significantly reduced relations such as North Korea, Iran, Syria and Cuba (Committee on Global Science Policy and Science

Diplomacy Development, Security and Cooperation, 2012: 30). This has seen the AAAS playing a role in coordinating trips abroad, while funding has been provided by institutions such as the John D. and Catherine T. MacArther Foundation and the Richard Lounsbery Foundation for cooperation in STI (Kramer, 2010b: 28). Within the US State Department there has been the inclusion of a science and technology advisor along with science fellowship programmes which see leading scientists and engineers drawing on their networks in addressing transnational challenges such as climate change and nuclear security (Flink and Schreiterer, 2010: 666; Turekian, 2018: 7). Other examples from developed countries include the UK, which from 2000 set up the Agenda for Global Change, including the creation of science and innovation networks aimed at expanding and replacing the foreign ministry's science counsellor networks. Japan, too, has been at the forefront of using science diplomacy, which it has patently linked to the idea of soft power in its foreign policy. This is evident in the 2008 memorandum issued by the Council for Science and Technology Policy, 'Towards the Reinforcement of Science and Technology Diplomacy', providing a larger role for STI in the country's international relations (Flink and Schreiterer, 2010: 666).

The question of where Africa is in the development of science diplomacy can be answered by looking at developments in the international structure and the impact of colonialism. While the geopolitical North was advancing through STI, Africa has been a target of scientific enquiry since the 1800s. The continent was perceived as primitive, a place in need of civilizing and building a scientific understanding, becoming the focus of scientific expeditions by those in search of resources that would ultimately support the colonial system (Keay, 1976; Gamito-Marques, 2020). As such, STI played a part in shaping the international structure today. This is a point highlighted by Hecht (2012: ix), who points to Africa's marginal position in the global uranium trade, where it is 'clear that colonialism remain[s] central to the nuclear order's technological and geo-political success'.

While research has expanded in countries such as the US and Japan, and across Europe, the increasing presence of emerging states in the field of STI, such as China, South Korea and India, have seen an increase in the proportion of research generated outside of these traditional sites of STI development. With the need for collaboration in addressing truly global challenges, scientists are looking towards engaging developing countries. This has seen a growth in research centres outside the geopolitical North, where knowledge is being developed through collaborative agreements as countries look to address the need for the creation of an 'internationally knowledgeable workforce' (Linkov et al, 2014). Yet work in STI development has also seen tensions arise between countries. Maher and Van Noorden (2021: 317) argued that while the COVID-19 pandemic intensified the focus on science and international collaboration, it also saw heightened tensions between states, particularly the US and China. This signals the need for further discussions on the role of science diplomacy as well as the capacity of African countries to engage in science diplomacy in addressing access and engagement in international STI relations.

Science diplomacy for Africa and by Africa

With STI linked to progress and development, countries are increasingly giving emphasis to research at both a national and global level of decision making (Van Langenhove, 2019). The level of emphasis is not, however, the same across countries and regions and in all global governance forums. This has direct implications for Africa, where capacity for developments in STI has been limited. This includes the ability of countries to invest in research and development, skills shortages including the low number of researchers per capita, lack of infrastructure and the costs associated with STI cooperation (Fellesson and Mählck, 2017; Pathways to Prosperity Commission, 2019; Ndung'u and Signé, 2020, UNGA, 2021). Given the limited ability to engage in research and development it is unsurprising that there has been limited discourse on science diplomacy emerging from Africa. Where there is analysis, this has been focused on the potential of science diplomacy rather than considerations of its role and implementation in practice (Toure, 2018; Ezekiel, 2020; Sharma et al, 2022). It has missed the question of how science diplomacy shapes international engagement and how this is applied in practice by countries for Africa and by Africa.

Science diplomacy: communication and cooperation

Communication and cooperation are central to the definitions of science diplomacy as a means of promoting engagement and collaboration. Hence Fedoroff's (2009: 9) understanding of science diplomacy as 'the use of scientific collaborations among nations to address the common problems facing 21st century humanity and to build constructive international partnerships'. Here, the role of formal diplomatic channels is highlighted, yet science diplomacy also encourages relations through informal networks and across STI communities (Track II diplomacy). The importance of communication and cooperation in science diplomacy is also a point addressed by Flink and Schreiterer (2010: 666), who argue that the purpose of science diplomacy is 'for the enhancement of scientific research and innovation capacities by way of international collaboration with mutual benefits'. Communication and cooperation aim to achieve the goals of science diplomacy, which include access (to researchers, research findings, facilities, natural resources and capital), promotion (of research and development achievements, also to attract best students, researchers and companies) and influence (other countries' public opinion, decision makers and political or economic leaders) (Flink and Schreiterer, 2010: 666).

In the African context, these principles have underpinned the rationale for engagement where relations have been strained. For example, some (but certainly not all) took the decision to continue engaging with apartheid South Africa in scientific collaboration despite the country's growing international isolation. The International Union of Pure and Applied Physics argued that this was a means to enhance understanding between people (Chetty, 2022).

With South Africa's democratic transition in 1994 the country expanded its own focus on science diplomacy as a means of enhancing cooperation and communication, particularly with countries within the Southern African region (Masters, 2016). This includes the Southern African Regional Science Initiative (SAFARI 2000) project, which brought together countries across Southern Africa and the US in exploring the emission, transport and deposition of aerosols and trace gasses within the region (Swap et al, 2002). Initiatives such as the Square Kilometre Array (SKA) radio telescope have also been viewed as a means of facilitating cooperation between countries in the region and internationally. Nevertheless, competition to access the radio telescope resources has been fierce, and by 2014 only 58 out of the 500 radio astronomers who were allocated time were from Africa, with a waiting list of up to five years (DST, 2014).

The literature concerning science diplomacy and Africa provides examples of engagement and the need for cooperation on STI for development, but there is little discussion on the development and conduct of science diplomacy for Africa and by Africa. Moctar Toure (2018: 1–2), former vice president of the World Academy of Sciences and former fellow of the African Academy of Sciences, acknowledges that transnational cooperation constitutes 'the most rational way to develop adequate solutions to the increasing acute and complex challenges facing the continent'. This is a point mirrored by the African Union (AU), and its predecessor the Organization of African Unity (OAU), which urges member states to work together on STI in support of the continent's development. This includes the creation of a Conference of Ministers in charge of science and technology (AMCOST) to support political collaboration and enable a collective voice on STI from the continent (AU, 2014: 14). By 2015 this was replaced by the Specialized Technical Committee Meeting on Education, Science and Technology (STC-EST), which has met at the level of minister in three ordinary sessions, with an extraordinary meeting called on 30 April 2020 (Addis Abba) to address the spread of the COVID-19 pandemic and to reiterate the role of science, technology and innovation in addressing the pandemic and continental development needs (AU, 2020). The STC-EST has also been part of an AU–European Union (EU) high-level policy dialogue for

STI, concluding the seventh plenary meeting in January 2022. The focus of the meeting was on addressing potential cooperation on a joint EU–AU innovation agenda (EU, 2022).

Yet the value of science diplomacy in supporting communication and cooperation between member states, and between an organization and its external milieu, is an area in need of further discussion. Initiatives like SAFARI, SKA and STC-EST are designed to promote cooperation, but do not always address the politics (priorities and interests), which undermines the sustainability of these projects. For instance, in the case of cyber security, while there was initial movement on creating a continental agreement (negotiated in 2015), as of April 2023 only 14 states had ratified the convention, leaving it one short of being adopted (AU, 2023). Egypt, Kenya, South Africa and Nigeria have failed to sign or ratify the agreement, leaving out some of Africa's leading states in cyber development (Fidler, 2016; AU, 2023).

In the case of COVID-19, which became the focus of the STC-EST and cooperation between Centres for Disease Control (CDC) across Africa, the division between the politics and the scientists limited cooperation where borders, and increasing national priorities, undermined engagement. As a researcher from Ghana pointed out, the continent had a shortfall in accessing reagent components, which meant reliance on resources from Europe, calling for 'African governments … to build scientific capacity sustainably rather than resorting to firefighting only when a pandemic hits. We should be preparing for the next pandemic as soon as this one ends' (Awandare, 2020: 586). In the case of COVID-19, the lack of communication and cooperation was extended to other regions of the world, where scientists in Europe too pointed to their ill-preparedness as well as lack of protective equipment, scarcity of doctors, nurses and technicians, and a political system that was not able to effectively manage the crisis (André, 2020: 586–7). These failings have demonstrated a necessary role for science diplomacy between countries in navigating the challenges of national priorities and interests. Addressing these shortfalls has seen, for example, the creation of a consortium of national academies of science from across Sub-Saharan Africa in addressing the impact of COVID-19, working with funding institutions from Canada, Sweden, the UK and the US (Kalele and Maphosa, 2021).[1] Nevertheless, these activities require the capacity to engage with research organizations across the region as well as ensuring that African interests are served in partnership and collaborative initiative with institutions from the Global North.

Science diplomacy: negotiation and representation

Science diplomacy aims to build channels of communication and facilitate cooperation, but as a political activity it is also about navigating priorities and interests of competing stakeholders when it comes to the governance of, and access to, STIs (Committee on Global Science Policy and Science Diplomacy Development, Security and Cooperation, 2012). Developing countries are confronted by inequality in addressing access to resources, research capacity and representation within STI negotiation forums. As has become evident, STI itself can act as a barrier to cooperation. For example, Hornsby and Parshotam (2018) point out that the science of developed countries has shaped the food trade standards, which in turn impede developing country agricultural exports to these countries. In other words, in addition to supporting cooperation and collaboration, science diplomacy plays a part in negotiating international structural inequalities while addressing country interests and priorities across bilateral and multilateral platforms (Doğan et al, 2021). This highlights the point that science diplomacy is for a political purpose, giving effect to foreign policy, creating advantage through expanding knowledge bases, presenting a means to manage conflict, as well as supporting capacity building and development commitments (Jacobson and Olšáková, 2020: 465–6). Science diplomacy is, at its core, diplomacy. Indeed, while the science may be perceived as rational, value neutral and universal (Adamson and Lalli, 2021), international politics has meant those engaged in science diplomacy face an environment where countries with a relative comparative advantage in STI may not want to engage in discussions on regulatory or governance system that may disrupt the current status quo (Seth, 2019: 4–5).

The politicization of science and the use of science diplomacy is evident within international forums. Developed countries such as the US have looked to take advantage of science diplomacy, with budgets allocated and priority given to STI research and development. As Alex Dehgan (in Kramer, 2010a: 30), science and technology advisor at the United States Agency for International Development, notes:

> many of the challenges for our foreign service officers around the world are going to be found in science and technology. There are going to be issues, like depletion of fisheries, global climate change, and how we manage energy, that are going to require a diplomatic corps that is much savvier about science and technology.

During the Obama administration (2009–17), science diplomacy played an active role in US foreign policy. The administration committed the US to 'open centres of scientific excellence in Africa, the Middle East and Southeast Asia, and appoint new science envoys to collaborate on programs that develop new sources of energy, create green jobs, digitize records, clean water, and grow new crops' (Turekian and Neureiter, 2012: 28). The EU too is, since February 2022, negotiating expanding scientific cooperation, including a focus on Africa through EU–Africa cooperation on research and innovation. Here there is evidence of an emerging role for science diplomacy by representatives from the African continent. This was apparent in the input from Africa's participants, who were openly critical of past engagement, noting that Europe should be supporting the levelling up of Africa's STI, with researchers offered the same opportunities in both Africa and Europe. It was also proposed that a database of African research be created to enhance visibility of contributions coming from the continent (Collins, 2022).

The preponderance of science on the international agenda for developed countries was also evident in the 2021 G7 summit hosted in Cornwall (UK). Here agreement was reached on a research compact with a focus on science and research collaboration in addressing global challenges (G7, 2021). Within the research compact, G7 countries committed to using their positions as 'leading science nations', ensuring transparency, integrity and the free flow of data in advancing innovation and knowledge, but with the proviso that the intellectual property and the security of the 'research ecosystem' is protected (G7, 2021). These discussions, however, serve to showcase the challenges of inequality and access for developing countries in negotiating STI, with only India and South Africa present as observers to the meeting.

While Africa may be looking to include science diplomacy within the diplomatic toolbox, the ability to adopt this approach in their statecraft is often lacking. As the AU (2014: 18) points out, this then only serves to increase inequality within relations:

> Bilateral and multilateral partnerships have shaped STI development in Africa (e.g. the European Union–Africa Joint Strategy, the India–Africa Science and Technology Initiatives and the China–Africa Science and Technology Partnership). However, most of these interventions and cooperation mechanisms are not adequately designed to promote African ownership, accountability and sustainability.

Negotiations, starting from the 1960s, presented STI as a solution to Africa's development; here Africa was the subject of science diplomacy. As African countries achieved their independence, the scope to address this position remained limited as the existing framework of negotiations discounted the local applicability of technology resources, social impact and economic costs, with many of Africa's countries unable to meet what was agreed on paper. The resulting disillusionment meant that later conferences saw a growing suspicion of Western approaches to technological development (Gaillard, 1992: 212–33).

With capacity limited in science and in the development of science diplomacy, when it comes to negotiation and representation Africa is playing catch-up. Representation is not always guaranteed in the world of science, where those without resources are often not included, and where access to STI knowledge can be 'wielded as an economic and cultural instrument as countries and institutions assert epistemic hegemony' (Adamson and Lalli, 2021: 7). The impact of colonization and underdevelopment have left Africa on the periphery of international negotiations when it comes to STI, where post-colonial countries continue to face low levels of STI productivity and deteriorating conditions in which research is carried out (Gaillard, 1992: 213). The challenge is that African countries are confronted by the realities of poverty, inadequate infrastructure, limited finance and lack of government support. This limits a county's options to engage in science diplomacy as most have only weak capacity for research and policy activities. There is also evidence that the foreign services of many African countries are not well prepared, or aware of the challenging tasks encompassing science diplomacy (Flink and Schreiterer, 2010).

Building capacity in science diplomacy in Africa is further hampered by an environment where there are increased restrictions on the mobility of researchers, weak public–private partnerships, shortfalls in communication between research agencies (in South–South as well as North–South cooperation), no incentives, lack of human capital and resources, divisions within research communities and failure of governments to follow up on their negotiated commitments (Committee on Global Science Policy and Science Diplomacy Development, Security and Cooperation, 2012). As scientists have pointed out when it comes to engagement, 'The drivers and the rewards for team science just really aren't there, yet' (Trudie Lang in Maher and Van Noorden, 2021: 317).

Science may provide answers, but politics can undermine solutions. This is evident in the case of the continued disagreement between the riparian states of the river Nile. While scientific evidence has been used to support an agreement in the dispute between Sudan and Egypt against Ethiopia, political interests have prevailed as Ethiopia continues to fill its Grand Renaissance Dam, citing its importance for water conservation and hydroelectricity to the country and region (UNSC, 2021). Science on its own does not drive agreement without the inclusion of diplomacy. In the context of the dispute on the waters of the Nile, there is an opportunity for the riparian states to employ science diplomacy, yet despite the potential this has not been pursued as an approach to negotiation. This points to a division between rhetoric and practice when it comes to the role of STI and science diplomacy. Science diplomacy is promoted as a means of furthering relations, yet it has not been considered in practice as an avenue for building cooperation.

There are long-standing policy developments within the AU aimed at addressing the role of STI in shaping inter- and intra-continental relations. This includes policy development on digital strategies, the creation of technology hubs, ICT strategies, a convention on cyber security and the protection of personal data (Masters, 2021). The Science, Technology and Innovation Strategy for Africa 2024 acknowledges the need for increased attention to STI, built on networks across the continent's research communities and those within the diaspora (AU, 2014: 9). In practice the African Academic of Sciences (AAS) has played a central role in supporting networks across the continent, particularly in the context of the COVID-19 pandemic. For instance, in February 2020, the AAS participated in the global World Health Organization (WHO)/Global Research Collaboration for Infectious Disease Preparedness and Response Forum (Kalele and Maphosa, 2021). In March 2020, the AAS went on to host a continent-wide webinar, including 250 scientists from Africa, on developing the continent's response to the pandemic, although it became evident that those engaged in STI research were not prepared or supported in managing the international politics in responding to the global pandemic.

There is a gap between policy and capacity in driving an African approach to science diplomacy. This is evident in the limited support African science academies receive from governments. Only half of the countries across Africa have national academies of science, and for those that do, rather than acting as a platform in promoting science diplomacy the science academies are mostly not functional or are even non-existent, undertaking ad hoc work (through lack of funding) rather than building sustained relations (Kalele and Maphosa, 2021). In fact, capacity constraints mean that Africa has few possibilities to participate in STI talks, unless developed countries focus on supplying technology to Africa, leaving Africans as consumers of knowledge (Masters, 2016). For example, while the continent is a major source of uranium for use in nuclear technology, there is a void in the conversation about Africa's role in shaping international nuclear governance. As Hecht (2012) points out, Africa is on the periphery of transnational technological systems, and those involved in mining have few options for challenging huge international mining companies' bad safety policies. While African countries may host the SKA radio telescope, it is primarily used by industrialized countries. On the question of STI and space, Asiyanbola and colleagues (2021: 55) argue for the importance of developments in space technology for managing water, infrastructure development, climate change, creating effective land policies and managing disasters but highlight Africa's lack of innovation, which 'translates to [Africa] buying satellites, lack of continuous funding, under-representation in international space forums and absence from the space sector'.

Conclusion

Science diplomacy as an emerging field of study and research has seen growth in its role and application in international relations. This is led by the developed countries, whose capacity and interests have seen states such as the US, Japan and those from across Europe building expertise within foreign ministries as well as providing financial and governmental support to institutions engaged in building collaborative international networks. Africa has been on the periphery of these developments given the context of colonial and continued underdevelopment. As such, discussions on science diplomacy have seen Africa as a theatre of discussion rather than as an active participant.

On paper and in the political rhetoric, the AU, a regional organization, and member countries give considered attention to the value of STI in promoting development, yet in practice there is little investment in the practice of science diplomacy. Given the impact of STI on society and its role in addressing global challenges, this is a discussion that the continent can ill afford to miss. Yet the biggest drawback to an emerging science diplomacy for and by Africa is that many of the AU's member countries lack the scientific communities and capacity within foreign ministries to bring together STI and diplomacy in practice. There is evidence of its embryonic role in projects among Africa's more developed countries, including examples such as the SKA, and cooperation between academies in support of efforts to address the COVID-19 pandemic, but this strategy must evolve beyond cooperation to include the development of science diplomacy to effectively navigate international relations.

Note

1 According to Kalele and Maphosa (2021) this included the Botswana Academy of Sciences, Kingdom of Eswatini Academy of Sciences, Mauritius Academy of Science and Technology, Zambia Academy of Sciences, Zimbabwe Academy of Sciences, South Africa Young Academy of Science, Zimbabwe Young Academy of Science, Mauritius Young Academy of Science, and the Democratic Republic of Congo Young Academy of Science.

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