Science Diplomacy Case Studies

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A New Lexicon of Science Diplomacy

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CASE STUDY

A New Lexicon of Science Diplomacy

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The Ideation of Science Diplomacy

"Diplomacy" – as one is taught at entry into any training school for diplomats – is the primary means by which a state gives effect to its statecraft. In its relations with other states, a state's diplomats are the first in the chain of links designed to effect the non-military ends of the state.

"Science Diplomacy" is about the harnessing of science and scientists to the practice of diplomacy. In 2007, the American Association for the Advancement of Science (AAAS) 'elevated' the locus of such harnessing to the status of one of its 'Centres'. That Centre was born of the experience of the positive role that scientists performed in smoothing diplomatic negotiations between the principal Cold War adversaries - the United States and the Soviet Union - to shape the Nuclear Non-Proliferation Treaty (NNPT), and other Arms Control treaties. Thus, "The Center", says the AAAS, "demonstrates how science can build bridges between societies where official relationships may be strained" (AAAS, 2018).

It is ironic that the NNPT was negotiated in the late-1960s between these adversarial super powers to give effect to their shared interest to stymie and control the spread of nuclear weapons and their enabling technologies to – in particular – the states of the global South. Since then the expression "science diplomacy' has migrated across the Atlantic into the foreign offices of some of the states of Europe. Reflecting – unconsciously maybe – their colonising history, one finds quasi-military epithets for 'scientific diplomacy' in their media, such as: « Un coup gagnant de la diplomatie scientifique de la France » ("A winning shot of the scientific diplomacy of France") (Ruffini, 2017).

Given those origins and some current modes of use of the expression 'science diplomacy', post-colonial states should perhaps question its appositeness to the purposes of their diplomacy. Indeed, those South states which have grown significant autonomous scientific and technological capabilities – and have developed them also to militarily usable ends – might consider eschewing the expression altogether, if only to pre-empt a neo-colonial attitude subliminally diffusing into their diplomats when practicing the art of 'science diplomacy' with co-South states.

A necessary morphological distinction

This essay[1] advances a morphology to classify and categorise the roles and dimensions of science and technology in the foreign policy, of a nation from the South: One that is apposite to its diplomatic postures in the different fora concerned with such science-informed global issues as climate change; to its scientific and technological relations with fellow Southern parties, as also to those of its engagements with the North as are mediated by science and technology (hereafter used as conjoint singular: S&T).

This case study formulates a classification and categorisation of the distinct roles and dimensions of science diplomacy at the intersection of a South nation's science and technology and its foreign policy.

The necessary distinction that needs to be recognised and drawn is the one between trans-national collaborations in scientific and technological fields as activities of scientific communities, and the hyphenated expression 'S&T-in-foreign policy'. Indeed, without such a distinction, one can be deliberating a mish-mash of issues at such prestigious-sounding conferences as: "The Evolving Role of Science and Technology in Foreign Relations: Implications for International Affairs in the 21st Century" [2] (Penn State Law, 2009).

While international collaborations in S&T usually take place between individual or groups of scientists across different countries, the incorporation of S&T in foreign policy has wider connotations. Thus, when the findings of science or the potential use of technology could have ramifications for international relations beyond the science or technology themselves, the pursuit of the science and the use – *or the denial of the use* – of technology, influence, or are influenced by, the foreign policy of the state. International engagements in such S&T are invariably negotiated between diplomats, advised by scientists.

Use of S&T endowments in diplomatic engagements

When international collaborative arrangements are settled between scientific communities, the primary drivers of the relationship are the scientists themselves, who pursue the scientific activities in such joint or closely-coordinated ways as carry the best promise of fulfilling their collective scientific expectations.

However, the motivations for trans-national scientific engagements of the above kind are distinct from those that animate the pro-active use *by a state* of its S&T endowments or capabilities. These endowments may be locational, such as the

UN-sponsored Thumba Equatorial Rocket Launching Station (TERLS) established at the magnetic equator in the South of India, or for the Laser Interferometer Gravitational-Wave Observatory (LIGO) experiment stations setup on opposite sides of the globe in the United States and India.

S&T endowments could also be niche-capabilities in designing and fabricating high-precision components of large assemblies. Such capabilities enable contributions in kind to be made, such as sub-systems for the International Thermonuclear Experimental Reactor (ITER) project in France, or the mirror-actuators for the Thirty Meter Telescope (TMT) in Hawaii. Other examples include the the reciprocal use of facilities such as those between the radio telescope at Arecibo in Puerto Rico, and the Giant Meter-wave Radio Telescope (GMRT), located in the West of India. Also the *non-reciprocal* offer of the use of Indian Space assets such as the South Asian Satellite (SAS), or unique astronomical observation facilities such as the infrared telescope in the Ladakh region (adjacent to China) of the northernmost Indian state of Jammu-and-Kashmir, are some other modes of scientific collaboration that carry significant foreign policy connotations.

Countries of the tropical South also tend to share similar epidemiological conditions, which facilitate regional scientific collaborations amongst them to validate interventions in preventive health, such as vaccine trials sponsored by the World Health Organisation (WHO). S&T thus becomes an item of diplomatic engagement when a country's natural or scientific endowments are sought or offered, *as a state*, in return for that country's participation in a collaborative scientific activity. Sometimes such collaboration may be arranged in an unrelated area of scientific interest: As, for example, allowing the field-study of endangered animals in their protected natural environment, in return for collaborative research on pharmaceuticals. When so participating as a state, a country's foreign policy takes 'pole position', so-to-speak, at the front-end of its international S&T engagements. Diplomatically mediated scientific collaborations and technology exchanges could thus be a form of a country's 'gentle power' – if that is not a contradiction in terms.

When the findings of science or the potential use of technology could have ramifications for international relations beyond the science or technology themselves, the ambit of joint activities is influenced by the foreign policy of the collaborating states.

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Science-informed diplomacy in the 'global commons'

As threats caused by human activity to shared global commons become ever more severe, diplomatic negotiations

over treaty-based national actions to mitigate them become increasingly underpinned by a common transnational appreciation of the underlying science. There are two hardly-known Indian traces to international science-informed diplomatic negotiations. The first of these is a post-visit report of a team of Indian scientists sent to Japan on "Nuclear Explosions and their Effects"[3] (MoIB, 1958), which subsequently formed the scientific foundation for the India-promoted Limited (Nuclear) Test Ban Treaty (LTBT). The second is the clutch of Kulkarni-Ramanathan studies dating to the late 1940s on the vertical transport of Ozone in the atmosphere (Ramanathan and Kulkarni, 1953). That work prompted the further detailed study of Ozone-CFC chemistry, which formed the scientific underpinning of the diplomatic negotiations on the Montreal Protocol (Benedick, 1991).[4]

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As human threats to the global commons become ever more severe, global diplomatic negotiations over treaty-based national actions to mitigate them become increasingly underpinned by a common transnational appreciation of the underlying science. Equally, unabashed exceptionalism in non-adherence to universal non-discriminatory treaties; unilateral withdrawals from them, or precipitating stalemates in their ongoing negotiations, signify a lack of appreciation – if not cussedness – by the lay leadership of countries of the underlying scientific drivers of these treaties, leading to a breakdown of international diplomatic engagement (Davenport, 2018; Schick, 2018).[5]

Some Think Tanks assert that ideological oppositions towards multilateral efforts and state interventions have led to scepticism towards the scientific facts of climate change

Worse, as noted recently – albeit in a different context – by the Director of a British Think Tank devoted to international relations: "..scepticism towards the facts of climate change often emanates from an ideological opposition to any policy solutions to reduce carbon emissions that require multilateral coordination and other forms of state intervention" (Niblett, 2018a). And yet those same Think Tanks routinely proffer advice to the South – solicited or not – to eschew state intervention for ameliorating Northern-technology induced social and environmental malfunctions that manifest so plainly, sometimes even dangerously, in so many countries of the eco-fragile South. A ubiquitous example is the commercial promotion of seeds for crop mono-cultures – on the sales-pitch of higher yields – despite evidence that plant communities produce greater yield than monocultures (Niblett, 2018b).

Science-disdained diplomacy in the 'three commons'

The Oceans, Space and Cyberspace constitute what might be termed the 'three commons'; the allusion being to an attribute common to them – all three domains are used by all nations. An international or multi-stakeholder policy conference or seminar is held almost weekly somewhere in the world on one or another of the 'three commons'. The literature prepared for or emanating from, these seminars and conferences is vast, and it would be otiose to try to summarise the current state of diplomatic play in the three domains.

In the two domains of oceans and space, there exist non-discriminatory international treaties that codify expected signatory behaviour in them . These codes apply – nominally at least – regardless of the economic capacity or technical ability of adherents to those treaties to access and use these two domains in accordance with the provisions of the treaties. International scientific consensus on the imperative for global action to ensure the use-sustainability of the oceans was instrumental in securing accession to the United Nations Convention on the Law of the Seas (UNCLOS) by an overwhelming majority of members of the UN. Yet, notwithstanding the urgings of the scientific community of a technologically very advanced state, the domestic ideological opposition to such a treaty has been powerful enough to prevent accession to it (Zuppinger-Dingley *et al.*, 2014).

Space is a domain that is particularly fragile. Over decades, scores of scientists globally collaborating across nations, and from several disciplines have illuminated and mapped that fragility. Their collective expertise has informed several diplomatic conclaves that have sought to set the norms of behaviour expected of responsible space-faring nations to ensure long-term sustainability of space. One of these, established as early as 1959 under the aegis of the United Nations, is permanent, and is devoted to the sustainable peaceful use of space by all states (University of Zurich, 2014). Space is electro-magnetically congested with live satellites, bathing that commons in potentially cross-interfering emissions from each other. It is also replete with their end-of-life remnants, and other debris. Science-informed diplomatic conclaves have been fruitful, albeit not without contention, in evolving international guidelines for the mitigation of orbital

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debris, and in forming an international consensus, based on shared technological experiences, in delineating best practices that facilitate the observance by space-faring nations of those guidelines.

But the space commons remains conflicted and contested even between those few states – and fewer yet of the South – which have autonomous technological means to access, compete in, and use it also for military ends (U.S. DoS, 2001).[5] So much so, a high official of the United States declared, flatly, that the space domain is "not a commons".[7]

When the official diplomatic track for the evolution of South-regional Cyber Confidence Building Measures (CCBMs) runs into roadblocks, or are stalemated [...] discussions amongst cyber scientists and other information technology specialists from the countries can serve as means to smoothen the process of building capacity and confidence, and pave the way for more formal diplomacy to bring order to shared, unruly cyberspace.

In the cyber domain, however, the S&T capabilities and expertise needed to mount offensive cyber attacks, and to effect retribution, is more evenly resident between North and South nations. Economic or political disruption caused by cyber offensives – attributable or not to an identified adversary, or 'rogue' – is felt with some pain; the richer the offended country, the greater its economic pain. No wonder then that calls by the North for a diplomacy-mediated, treaty-based global cyber order have an urgent ring to them (Vander Meer, 2015).[8] The contrast with the attitude of the 'space have' states in care-taking the space commons is palpable. And when the official diplomatic track for the evolution of South-regional Cyber Confidence Building Measures (CCBMs) runs into roadblocks, or is stalemated – as has happened in the ASEAN for, amongst other reasons, steep differentials in technical capabilities between ASEAN member-states – discussions amongst cyber scientists and other information technology specialists from the countries can serve as means to smoothen the process of building capacity and confidence, and pave the way for more formal diplomacy to bring order to shared, unruly cyberspace (Global Commission, 2018; Tan, 2018).

Yet, even while the politically influential cyber industry in the cyber-vulnerable North has called for international conventions to govern the cyber commons (Smith, 2017a), research is accelerating into technologies that exploit quantum physics so as to enable a segmentation of the cyber commons into quantum-haves and have-nots, with attendant controls over the sharing of such technologies (Smith, 2017b).

International exchanges in 'high technology'

Technologies whose trade across national borders is controlled for foreign policy or national security reasons are referred to – somewhat loosely – as 'high technology'. Such technologies are characterised by their 'dual-use' nature:

that is, they are capable of being used for both civilian and military purposes. Indeed, the geo-techno-politics of international trade in such 'high technology' have driven the design of North-coordinated control regimes at the tri-junction of S&T, foreign policies of states, and international trade.[9]

Ironically, the self-development of high technology by technologically capable countries of the South can reverse their position from being 'discriminatee' countries for targeted denial of 'dual use' technologies, to that of a 'participant discriminator'. Thus, India's successful self-development of Satellite Launch Vehicles from the late-1970s, as one pillar of its then-nascent Space programme, triggered the formation in 1987 of the North-inspired and dominated Missile Technology Control Regime (MTCR), of which technology-denial regime India was the prime target. However, with many countries of the North wanting to take advantage of India's self-developed capability of launching satellites at low cost, and India wishing to, *inter alia,* secure both commercial and foreign-policy benefits from that capability, India joined MTCR in 2016 as full member.[10]

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Even as the likelihood of armed conflict between previous cold-war adversaries has diminished, economic (and possibly military) peer-competitors to the West are rising in the East and South. The fear of losing dominance-enabling technologies – evocatingly labelled 'haemorrhaging' – is now prompting restrictions on international exchanges in what might be called 'high science', in anticipation of the latter's possible manifestation into forms of technology (Smith, 2017b), that enable the conduct of economic or/and 'non-contact' warfare.

Shifts in the geography of science and their diplomatic consequences

A data-supported article in the widely-subscribed international scientific journal *Nature* published on 18 October 2012 draws attention to a very significant shift that is taking place in the geography of science. The article notes: "Networks of research collaboration are expanding in every region of the globe. US and Europe, the established science superpowers, have dominated the research world since 1945. Yet this Atlantic axis is unlikely to be the main focus of research by 2045, or perhaps even by 2020." This quote is indicative of a science 're-balance' to Asia. One

notes wryly the use in that quote of such expressions as 'science superpowers' and 'Atlantic axis'. These metaphors for power-based international relationships would be considered politically incorrect in the world of science.

As countries of the South enlarge their 'scientific presence' in more S&T fields, more entities, from both the South and North with a similar 'scientific presence', will seek to collaborate with the state and non-state institutions of such countries. And inevitably, as the technological capabilities of the South rise 'higher'– in part through such collaborations themselves – the implications of these collaborations will lie increasingly at the confluence of S&T, foreign policy and national security.

As countries of the South enlarge their 'scientific presence' in more S&T fields, more entities with a similar 'scientific presence' across the globe will seek to collaborate. And inevitably, as the technological capabilities of the South rise 'higher', the implications of these collaborations will lie increasingly at the confluence of S&T, foreign policy and national security.

In anticipation of the diplomatic consequences of such progression in their S&T capabilities, the more technologically endowed states of the South might consider arranging that their respective Foreign Offices be the primary locus of shaping S&T relations with technologically developed states, while being supporting chaperons for their respective adhering bodies to the International Council of Scientific Unions (ICSU), S&T Ministries, CONICYTs and similar, for effecting fruitful collaborations in science with their counterparts in other South countries; as also with associations of technocrat-owned, innovation-driven small businesses in the 'middle-income', co-developing rapid-growers in particular.[11] As they progress in their own regional and global engagements in S&T, South countries with academies or training institutions for their diplomats would be well advised to evolve their own curricula and training material, particularly those intended to guide their faculty.[12]

Endnotes

1. This theme builds on an earlier publication of the author: "The Roles and Dimensions of Science and Technology in India's Foreign Policy", *Defence Science Journal*, Vol. 67, No. 4, July 2017, pp. 481-482.
2. Held in 2009, the conference organisers seemed to have been unaware of even the AAAS three-way slicing of the subject that this volume is devoted to.
3. The report predated the more familiar and widely quoted 'Glasstone report' (1964) from the US Atomic Energy Commission and Department of Defense on the "The Effects of Nuclear Weapons".
4. As expectable, the above-reported investigation by South scientists – barely free from colonialism – has not been given credit in frequently-cited works on the Montreal Protocol (Benedick, 1991)

5. Cases as these provide cautionary tales for diplomats – from the South especially – who tend to assume that the diplomatic positions taken by the North at such negotiations may be trusted to rely on proclaimed imperatives – or asserted leeway – to flow from scientific principles or validated evidence presented by the North The South will need to evolve collaborative arrangements amongst its colatitude-anists to enable it to exercise what became the leitmotif during the Cold War in negotiations between the warriors towards arms control – "trust but verify".
6. Although the United States now recognizes the UN Convention on the Law of the Seas (UNLCOS) as a codification of customary international law, it has not ratified it. Nevertheless, the U.S. considers it has locus standi to formally admonish a treaty ratifier, The Maldives – a small island in the Indian Ocean, whose very existence is threatened by rising sea levels – that it is not in compliance with a provision of UNCLOS.
7. First established as an ad hoc committee, the UN's Committee on the Peaceful Uses of Outer Space (COPUOS) was made a permanent committee in 1959 with General Assembly Resolution 1472 (XIV).
8. The literature devoted to this subject, and on international law relating to it, is vast. For a recent, encyclopedic reference work one may refer Ram S. Jakhu and Joseph N. Pelton (2018) and Pace (2017)
9. The four multi-lateral technology export control regimes are: The Nuclear Suppliers Group (NSG); the Missile Technology Control Regime (MTCR); the Australia Group and the Wassenaar Arrangement (WA), (The purposes and evolution of each are displayed on their respective websites.)
10. As early as 1993, India had promulgated its own list of materials, equipment and technologies whose export from India required a license from its Government. Concurrent with India's S&T capabilities and industrial spread in these 'high technologies' advancing to becoming commercially tradable across her borders, this list has been periodically expanded. In 2013, India began a process of concordance with the regime lists of its own list. By 2014, India had wide extant member support for her membership of the four technology control regimes.
11. For example the India-ASEAN 'Inno Tech' Summit that was held at the end on November, 2018. For details, visit: http://www.iasinnotechsummit.com/
12. And for assembly of such material, prudence is advised when drawn to such otherwise useful work as in Weiss (2012).

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Forum for Indian Science Diplomacy

As part of its ongoing research studies on Science &Technology and Innovation (STI), RIS together with the National Institute of Advanced Studies (NIAS), Bangalore has endeavoured a major project for Science Diplomacy this year, supported by the Department of Science and Technology. The programme was launched on 7 May 2018 at New Delhi. Forum for Indian Science Diplomacy (FISD), under the RIS–NIAS Science Diplomacy Programme envisages harnessing science diplomacy in areas of critical importance for national development and S&T cooperation.

The key objective of the Forum is to realize the potential of Science Diplomacy by various means, including Capacity building in science diplomacy, developing networks and Science diplomacy for strategic thinking. It aims for leveraging the strengths and expertise of Indian Diaspora working in the field of S&T to help the nation meet its agenda in some select S&T sectors.

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