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Science Diplomacy

India's Global Digest of Multidisciplinary Science

SPECIAL COVERAGE ON SCIENCE COUNSELLORS

CONTENTS

Editorial

Science Counsellors: *Paving the Way Forward*

In recent times, there has been a swollen rise in the number of opportunities and activities demonstrating the role of Science Diplomacy (SD) for the benefit of humankind. We have witnessed SD playing a critical role in meeting energy security, food security, affordable health care, managing freshwater, and exploring sustainable solutions to make a better environment (earth) to live in. Each crisis looks for a diplomatic effort. The COVID-19 pandemic has further illustrated the magnitude of the SD efforts in bringing different communities together to control the spread and resolve the issue. The development of COVID-19 vaccines and their distribution in such a short span is a testament to the same. Moreover, the pandemic helped in boosting the connection between science and society. At the same time, it turned out to be an eye-opener that SD has a far-reaching role in achieving Sustainable Development Goals (SDGs) through sharing of S&T, not only for North but for South as well. This has led to a surge in international scientific collaboration, especially in the health sector amongst north-south and south-south regions.

This special issue of the *Science Diplomacy* digest aims to provide an overview of the roles and responsibilities of the Science Counsellors in establishing international contacts and reshaping the SD strategies of their countries. It contains a collection of four manuscripts from the British High Commission, New Delhi; Embassy of Hungary, New Delhi; Embassy of Italy, New Delhi and Embassy of India, Germany. The first article on the Italian Science Diplomacy in India by Francesco Varriale, First Counsellor, Head of Economic & Innovation Department, Embassy of Italy, explores the role of the Italian Ministry of Foreign Affairs and International Cooperation (MAECI) in promoting the internationalisation of Italian research and scientific diplomacy as essential tools for developing joint strategies between Italy and the rest of the world.

The second article by Hilda Farkas, Counsellor (Science and Technology), Embassy of Hungary, New Delhi, explains the institutional framework of science diplomacy in Hungary. Furthermore, it elaborates on the most prioritised areas for science diplomacy in Hungary's foreign policy at present. The evolution of Hungary-India bilateral cooperation has also been discussed.

The third article by Sarah Fallon, Regional Director (India, Middle East, Africa), Science and Innovation, British High Commission, talks about the UK-INDIA science cooperation and collaborative projects like the UK-India Virtual Vaccines Hub and CLiP programmes in detail. She exclaims that the real magic of science diplomacy lies in brokering science, technology and innovation partnerships that deliver benefits to the whole of mankind.

Lastly, an opinion piece by Madhusudan Reddy Nandineni, Counsellor (Science & Technology), Embassy of India, Germany, shares the skills to be instilled in a scientist to become a science diplomat and ways to promote linkages between different stakeholders of science diplomacy.

These four articles in this special issue cover the spectrum of SD activities in the foreign policies of various countries, functions of science counsellors and scientists in Embassies and future areas of collaboration in those countries. We invite you to read these articles and hope these would guide your future research, alliances and diplomatic efforts.

Enjoy reading it.

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Italian Science Diplomacy in India

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"*Principles for the Development of a Complete Mind: Study the science of art. Study the art of science. Develop your senses - especially learn how to see. Realise that everything connects to everything else.*" Leonardo da Vinci.

We greatly value Science Diplomacy, whose growing importance in foreign policy relies on its capacity to harness the soft power of science in maintaining peaceful relations between countries. Science has the intrinsic ability to support teamwork above and across boundaries, which is a crucial instrument in maintaining an open dialogue between people, even at conflicting times. International scientific cooperation also represents an effective strategy to address global challenges that no single nation can solve on its own (e.g. global warming, pandemics, etc.), while the resulting technological progress and its industrial applications ultimately impact the economy and society as a whole.

The Italian Ministry of Foreign Affairs and International Cooperation (MAECI) is promoting the internationalisation of Italian research and scientific diplomacy as essential tools for developing joint strategies between Italy and the rest of the world. To do so, it draws on a network of attachés and experts who showcase and capitalise on the sectors of excellence in scientific and technological research and support Italian companies operating in advanced technology sectors. Most science and technology experts and attachés are from Italian research bodies and universities.

MAECI's policy stems from the rationality that there can be no economic development without innovation. Maintaining competitiveness in increasingly complex global markets requires continuous enhancement of new technologies to create innovative and high-added-value products. It leads to increasingly careful use of resources in this sector as an investment in the country's growth with positive effects on the economy and trade.

In 2018, MAECI in partnership with the Ministry of Education, University and Research and the Ministry of Health, launched the "Italian Research Day in the World", to internationally promote the contributions of Italian scientists. Since then, on the birth anniversary of the Italian genius Leonardo da Vinci (15 April 1452), the Embassies and Consulates support the initiative by celebrating the image of Italy's Science worldwide.

The main instruments of Italian Science Diplomacy are the *Executive Protocols* on bilateral cooperation in science and technology. These are direct applications of specific bilateral agreements and have multiyear validity. The *Executive Protocols* specify the areas to which Italy and a partner country are to dedicate joint research. They select scientific projects, which can be of two types: Researcher Mobility Projects (bilaterally financed projects in which travel and living expenses for researchers are covered) and Projects of Major Importance, eligible for annual co-financing.

In particular, I wish to highlight the importance of researchers' exchange to fulfil the objectives of

Science Diplomacy. Mutual visits are essential to internationalisation, especially for young scientists, who are encouraged to establish and consolidate valuable relations outside their home country. These efforts are rewarding in the long term, as they can generate innovation through synergies.

The bilateral cooperation between Italy and India in science and technology lies in the solid foundations of past and present co-actions between the research institutions of our two countries. More than 250 bilateral agreements have been signed over the years between universities and research institutes, thus creating a collaborative environment and achieving the excellent level of cooperation witnessed today. India is, therefore, strategic for Italy, not only for the successful and longstanding partnership in fundamental and technological research but also for the importance that both countries assign to technology transfer as a key enabler to promote innovation.

On 12 January 2020, Italy and India signed the bilateral Executive Protocol for FY 2022-2024. It further expands the priority themes of mutual interest and develops additional funding schemes called "Networks of Excellence". Such an innovative tool aims at establishing bilateral consortia composed of three or more institutions from each country, possibly including private partners. These networks are expected to create a stable Indo-Italian core group, focusing on key scientific issues with multidisciplinary approaches, and to mobilise funding from national and international, public and private entities so as to continue their collaborative activities well beyond the initial three-year funding period.

From the viewpoint of Science Diplomacy, this joint effort not only represents strong support for international dialogue but also paves the way for new developments and technologies that can be transferred to the industrial sector in the longer term. The Protocol is financing 13 Researcher Mobility Projects, 8 Projects of Major Importance and 3 Networks of Excellence. Some of the selected areas of mutual interest are:

- research topics related to the ecological transition, aiming at reducing atmospheric pollutants while increasing renewable/ green energy sources to prevent the devastating effects of climate change;
- health research, leading to preventive as well as therapeutic applications to communicable and non-communicable diseases and proved to be especially important during the pandemic emergency;
- science and technology applied to cultural and natural heritage, an area of special relevance as it exploits the scientific expertise of our scientists towards the noble and crucial objective of preserving the remnants of ancient traditions of both countries;
- physics of matter, which includes a remarkable joint initiative within the Italian synchrotron facility ELETTRA. It was implemented by the Indian government with two sophisticated diffraction beamlines for advanced material research. Indian scientists are the third highest users of this sophisticated infrastructure that represents a best practice of international cooperation in science, technology and innovation.

Finally, I also wish to mention our bilateral cooperation in the field of innovation, leading to synergies on industrial projects with the Indian Global Innovation and Technology Alliance (GITA). Within this funding scheme, we are presently supporting two projects in the thematic areas of mutual interest "Advanced Manufacturing and Materials" and "Clean Technologies".

About Hungarian Science Diplomacy and its Successes in India

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Introduction

As one of the newest specialised fields of international relations, the connection of science and diplomacy for conscious and defined goals is a characteristically 21st-century development however, some of its elements appeared long ago. For instance, based on the initiative of scientists, diplomats and intellectuals from the European Intergovernmental Scientific Organisation, the European Organisation for Nuclear Research (CERN) was born in 1954. One of its goals was to establish international scientific cooperation based on the neutrality and universality of science. After World War II, the initiators specifically saw the chances of restoring relations between the countries in this cooperation. The initiative proved its viability, followed by many others.

Science diplomacy is, therefore, scientific cooperation between nations whipped up to resolve problems affecting two or more countries or the whole world (e.g., nuclear fusion research in ITER, Covid-19 pandemic) and to establish constructive international partnerships. Science diplomacy is an umbrella term that includes formal or informal relationships set up in various scientific, technological, research, development and innovation (RDI) fields. RDI policy using evidence-based science is becoming firmly embedded in foreign policies, economic diplomacy, and the system of bilateral and multilateral international cooperation of individual countries.

Institutional Framework of Science Diplomacy in Hungary

The crucial Hungarian players in science policy and science diplomacy are the Ministry of Culture and Innovation, the Hungarian Academy of Sciences, the National Research, Development and Innovation Office (NRDIO), the Eötvös Loránd Research Network and the Department of Culture and Science Diplomacy of the Ministry of Foreign Affairs and Trade.

In May 2022, the Government of Hungary assigned the tasks and powers of the minister responsible for culture and innovation to government science policy, higher education, and their coordination. Within this framework, it is also responsible for the financing of research, development and innovation programs.

The Hungarian Parliament approved an RDI law in 2014 about scientific research, development and innovation (Act2014/LXXVI), which laid down the principles and rules regarding the relationship between the state and those involved in RDI. It established a stable institutional system, NRDIO, for governmental coordination and financing of Hungarian RDI and the efficient and transparent use of available resources. It created a National Research, Development and Innovation Fund (NRDI Fund), which is a separate state fund.

The NRDIO is the primary executor body of the intergovernmental bilateral science and technology cooperation agreements, has cooperation agreements with numerous organisations responsible for RDI policy and funding, and participates in multilateral international STI cooperation (COST, EUREKA, ICGEB, EMBL, ESFRI, ITER, CERN, XFEL, ESS, OECD, TAFTIE, etc.). It has a coordinating role in professional tasks related to the Hungarian participation in international research infrastructures.

The Place of Science Diplomacy in the Hungarian Foreign Service

The Ministry of Foreign Affairs and Trade is primarily responsible for implementing science diplomacy goals in the Hungarian Government. The classical diplomatic and foreign trade activities of the ministry are organically connected with the knowledge-based, innovative approach and the international promotion of Hungarian RDI results. With the introduction of the integrated foreign representation system in 2014, covering science diplomacy became the task of all Hungarian foreign missions. The scientific and technological field is principally dealt with by those foreign missions where science and technology counsellor is designated. In the absence of an STI counsellor, these matters are the responsibility of economic and trade attachés. Hungary currently maintains intergovernmental bilateral STI cooperation with 36 countries and has signed inter-institutional scientific and technological agreements with another ten countries.

Tasks prioritised by science diplomacy appear along different centres of gravity for each region/ country and change dynamically over time, as they precisely follow the extremely fast-changing RDI trends. Presently in Hungary's foreign policy, the most prioritised areas for science diplomacy are:

- Industry 4.0
- Digitisation
- Start-ups
- Smart city developments
- Connected and self-driving vehicles, electromobility (ZalaZONE Science Park)
- The Szeged Laser Center (ELI-ALPS)
- National Laboratories Program
- Water innovation
- Agricultural innovation
- Healthcare innovation
- Creative industry, design
- Higher education mobility

The Department of Cultural and Science Diplomacy of the Ministry of Foreign Affairs and Trade shares the achievement of the defined goals of science diplomacy by informing government actors, providing professional guidelines for the science diplomats of foreign missions, as well as facilitating international collaborations (e.g., Visegrád4 partnership) and other thematic programs.

This Department organises a Scientific and Technological Conference every year, where the main objective is to provide a professional forum and discussion opportunity for the actors of science diplomacy, to share information on the current trends and priorities of science diplomacy, and to determine further direction of professional activity. The science diplomacy website, operating since 2016, is a public interface on which current events and news of Hungarian science diplomacy are reported. The Department supervises and coordinates the activities of Hungarian foreign missions, jointly operates the STI diplomatic network with NRDIO, and provides project financing. Currently, 14 STI diplomats are active in different locations, and the network is expanding each year.

In Hungary, one of the priority tasks is to develop RDI cooperation of the regional Visegrád4 Group (V4– Hungary, Poland, Slovakia and the Czech Republic) with other countries. Consequently, much successful collaborations have been made with Israel, Japan and Korea.

Hungarian Science Diplomacy in India

The Hungary-India bilateral cooperation is based on the science and technology agreement (1992), the implementation of which is the responsibility of the NRDIO and the Ministry of Science and Technology, India. This agreement gained real momentum when, during the Hungarian Prime Minister's visit to India in 2008, the two parties agreed to set up a Joint Strategic Research Fund. Subsequently, the countries advertise joint calls for research programs every two years. Since 2013, 29 projects have been supported. Within the framework, applied research projects receive support for a maximum of three years which can lead to innovative products, procedures and services in defined focus areas. The dynamically developing interest of Indian researchers in Hungary and India's spectacular research achievements encouraged Hungary to give further impetus to bilateral STI cooperation. Therefore, a Science Counsellor was appointed to New Delhi in March 2017. This has noticeably increased the activity in joint research programs, as nearly 100 applications were received in 2019.

Relations between inter-university and research institutes are also developing dynamically, which is demonstrated by the fact that 14 inter-institutional cooperation agreements were inked during 2018-2022 with the assistance of the Hungarian embassy in New Delhi. These MoUs primarily focus on joint research activities, knowledge sharing, scientific events, student and academic exchange programs, and lately, innovation activities and elaborating joint degree programs. Interest in joint participation in the EU's research framework program is growing too.

It must be noted that both governments signed their Cultural Agreement in 1962, and the bilateral Educational Exchange Program was concluded in November 2014. Now, it is in the process of being renewed. The program offers 200 Stipendium Hungaricum Scholarships to Indian students to pursue higher education studies in Hungary, in Hungarian or English. The program is quite popular, with almost 2,000 Indian students submitting their applications for the 2022-2023 academic year. Concomitantly, interest in self-financed education is growing, with approximately 1000 Indian students currently studying in Hungary.

The number of mutual visits and joint scientific programs is also growing, with an average of 50 such small and large events taking place annually in the Hungarian-Indian context. The Covid-19 pandemic could not reduce this trend, as the programs quickly shifted to the virtual space.

Conclusion

It is obvious that Hungary is striving to introduce the traditionally outstanding Hungarian scientific results into the international space. It is also clear that, for this purpose, our country is trying to use a wide range of science diplomacy tools, where India is one of the target areas. The size and population disparity between the two nations does not hinder this cooperation and offers a common advantage to both countries. Nonetheless, there are ample opportunities yet to be fully explored. Hence, the goal of Hungarian science diplomacy is to make the relations between the two countries as effective as possible through joint efforts in the international scientific and innovation ecosystem.

When I Dream of Magic, I Think of Science

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The second question people always ask me, as Regional Director of Science, Innovation, Health and Tech at the British High Commission in New Delhi (after "do you get to meet astronauts?"), is what I enjoy most about my job. My answer is always the same: "I travel into the future on a daily basis".

My goal is to build and strengthen prosperity-driven connections between science and innovation policymakers, thinkers and doers in the UK and India. It presents me with a challenging problem – albeit an enviable one. India's science and innovation community is young, dynamic, mobile and keen to partner with us: Opportunities pop up daily across a wide range of States - more than my hard-working team can realistically broker. Furthermore, we have support from the very top of a complex and skilled administration governing the biggest democracy in the world - Indian Prime Minister Narendra Modi has called the UK-India science partnership an "unbeatable combination". With a flurry of Ministerial engagement in the pipeline, my team is working with Indian counterparts to realise a tantalising vista of science diplomacy possibilities visible over the next 10-50 years.

My job is part detective, part cheerleader, part oyster shucker – like a 16-person science diplomacy algorithm, we identify, assess and prioritise the ideas that UK and India think will define tomorrow and forge bilateral alliances to catalyse their potential. The pearls we covet – the moments when I log off feeling like I am living my best science counsellor life – are when the brightest science and innovation minds in the UK and India collaboratively make groundbreaking research discoveries, save lives or propel pioneering innovations into each other's marketplace.

They say great moments are always the work of many. They also often take time to bloom, skidding messily across multiple annual delivery plans, disrespectful of our impact reporting frameworks. This gig is not for the faint-hearted or people thirsty for a quick fix. It is pertinent, as science diplomats, that we feel comfortable on the frontier: Whilst we strive for success, and the work is undoubtedly exciting, a percentage of our plans will fail. Whilst we all want to place our carefully curated consortia confidently onto the Whitehall or public-private conveyor belt to grow into the larger scale market, infrastructure or research propositions, sometimes they won't be viable. If evidence suggests initiatives will fail – we record and share those insights too. It is crucial as it allows UK Government departments, agencies and key private sector stakeholders to make informed decisions before enormous amounts of funding are committed to programmes.

My favourite thing about being a science counsellor is my team's agility: We can move quickly whenever we need. We are structured uniquely in the High Commission, which enables us to quickly turn a strong political headwind or a global challenge into a science superpower story. COP26 and the COVID-19 pandemic have demonstrated it and given two excellent recent examples of how UK and Indian science cooperation can bring tangible benefits to its citizens' lives through game-changing vaccines.

Over the past year, the **UK-India Virtual Vaccines Hub** brought UK and Indian vaccine regulators together – which was crucial in ensuring UK and Indian authorisation of the Oxford Astra Zeneca vaccine – and were informed by the most comprehensive possible datasets. This regulatory diplomacy also boosted both countries' citizens' confidence that the Astra Zeneca vaccine was safe, maintaining decent uptake during the critical early period of the vaccine rollout. Thanks to the Vaccines Hub, we can compare notes rapidly with key Indian counterparts on deployment, supply, variants and keeping a global distribution fair.

Our climate change and environment work go from strength to strength, with marine science collaborations being a shiny jewel in our science diplomacy crown. My team brokered the **UK-India pilot project under the Commonwealth Litter Programme (CLiP)**, which aims to understand deteriorating seawater quality due to marine litter. It kicked off in 2021 and involved technology-sharing through a microplastics (MP) sampling pump, loaned by Defra's Centre for Environment, Fisheries and Aquaculture Science (Cefas) to India's National Centre for Coastal Research. This dynamic group of scientists has managed – despite many pandemic-related challenges - to do no less than three research cruises off the Chennai-Puducherry coast over the last year, collecting and jointly analysing 300 water and sediment samples, leading to the publication of three joint research papers. We launched the first-ever deep sea expedition between Indian, Maldivian and UK scientists in early September, which was a huge success, and I'm excited to see where this groundbreaking ocean science partnership between the two countries will go next.

UK and Indian scientists jointly examining samples collected using the Micro FTR plastic pump shared by UK for this project (left), and participating in a deep-sea expedition going to the depth of 1000 meters as part of a trilateral mission with the Maldives (right)

Our Newton Fund work is another source of great pride, exemplifying the impact of when UK and Indian scientists put their heads together to solve pressing global challenges. The **UK Met Office partnered with the Indian Ministry of Earth Sciences (MoES)** to develop weather prediction tools through the **Weather and Climate Science for Service Partnership** (WCSSP) programme supported by Newton Fund. The tool provides timely forecast guidance to produce earlier and more accurate warnings of extreme weather events. It allows Governments, policymakers and citizens more time to act and **reduce the impacts of flooding, monsoons and landslides. Tamil Nadu innovators have taken their Newton-funded projects to the next level to design SEVILI - a low-cost, fully functional robot to help frontline medical personnel serve COVID-19 patients.**

This robot reduces human exposure to the disease by taking medicines, water, food and other necessities to a person in the isolation ward. It is WiFi-enabled, specifically designed to understand Indian accents and uses artificial intelligence to suggest future movements. **SEVILI comes at a quarter of the cost of similar AI-based robots in the marketplace.**

I have the privilege of meeting many "21st century magicians" redefining the course of history from their labs or incubators. My value as a science diplomat is drawing their brilliance together to solve the most pressing problems, save lives or generate prosperity for both countries. It is this mission that motivates me on those bleak Monday mornings in Delhi when the breakthroughs seem far out of reach or conversations stall. On those days, I try to focus on what we've achieved this past year – how our endless Teams calls, and frank exchanges leave the world's oceans cleaner, with fragile biodiversity ecosystems intact for future generations. How our meticulously choreographed WhatsApp and Note Verbales, fired carefully into a system between power cuts and all staff meetings, swirl at the right time led to the vaccination of 10 million British people two weeks later. The British and Indian innovators riding their co-developed electric transport around the IISc, Bangalore campus for the first-time last year made everyone feel supported and optimistic that the future is open, free and full of possibilities. This is where the real magic of science diplomacy lies – brokering science, technology and innovation partnerships that deliver benefits our citizens can touch, see and feel in every corner of our countries. I look forward to continuing my professional time travelling – and hopefully meeting some astronauts along the way.

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Dr Madhusudan Reddy Nandineni is the Scientific Attaché/ Science Counsellor at the Embassy of India in Berlin, Germany. Prior to this, he was a Staff Scientist and Group Leader in the Laboratory of Genomics & Profiling Applications and DNA Fingerprinting Services at the DBT-Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad. His current research interests include studies on human genetic diversity in Indian populations, developing novel methodologies for human forensic DNA profiling, generating molecular markers for plant genetic fidelity testing and plant-microbe interaction studies. Here, Dr Nandineni talks about India's Science Diplomacy and much more.

Significance of Science Diplomacy

Science diplomacy enables bringing countries together to develop international scientific partnerships to address universal challenges and achieve sustainable development goals. The recent example of the COVID-19 pandemic has shown that the problems faced by humanity can be effectively countered by robust scientific collaboration at the regional and global levels. Science diplomacy has facilitated cooperation between various governmental and non-governmental agencies on diverse scientific agendas like clean energy, combating climate change, food security, health and biodiversity and provided high-quality scientific advice to resolve the issues. The combined efforts aid in tackling global threats which cannot be fixed by individual countries. Science diplomacy goes beyond geographical boundaries to improve international relations even during hostile situations.

Best Practices to Strengthen Science Diplomacy

Science, technology and innovation (STI) are deeply intertwined with issues of global concern like climate change, health, and food and energy security. There is a need to bridge the gap between the different stakeholders of science diplomacy to equip them to deal with the universal challenges. Linkages may be strengthened by ensuring dialogue and cooperation amongst scientists and diplomats and bringing scientists who work in a bottom-up atmosphere within the top-down hierarchy in foreign missions. Building trust and confidence between different players is a vital aspect of achieving the goals of science diplomacy.

A synergistic relationship between scientists and diplomats contributes to the progress of science and technology (S&T), sustainable development of human society and solving overarching issues. Close coordination between scientists and diplomats has facilitated evidence-based positioning of the country on matters of global significance. Cooperation between higher educational institutions and S&T organisations in curiosity-driven research and innovation (R&I) is critical to developing mutually beneficial collaborative programs between the countries.

Creating a pool of science diplomats from various science departments/ Ministries would be immensely useful to leverage the advantages of science diplomacy on global fora. Recruiting scientists at an early stage of their career and providing them with the requisite training in foreign policy skills and nuances would be a step in the direction of creating a pool of science diplomats. It would create alternative career options for the accomplished scientists who wish to get involved with science diplomacy objectives. The number and the geographical reach of science diplomats need expansion to ensure that almost all major regions/ countries of the world are connected.

Desirable Skills for a Science Diplomat

By being apolitical and by their universal brotherhood, scientists support building bridges between the countries' leadership and people to search for solutions. A dedicated scientist with a clear understanding of the issues affecting the world and their plausible answers is best suited for a science diplomat's role. They should be able to facilitate and promote collaborations by following the latest S&T developments, breakthroughs and innovations in the host countries and linking the various stakeholders with those from their country of origin. An accomplished and well-connected scientist can extend connections across diverse disciplines and monitor and report on the latest cutting-edge research in the host country.

Moreover, a prospective/ aspiring Science diplomat must possess a deep understanding of the R&I policies at the national and international level and hold good intercultural communication and writing skills coupled with scientific credibility and experience. Having excellent negotiation skills and cross-disciplinary awareness is a must. Of late, R&I has emerged as an essential engine for the economic prosperity of a country and science diplomats must be trained to play a significant role in realising the economic and technological capabilities. There are cultural differences between scientific institutions and diplomatic missions, and hence to be successful, science diplomats must be able to adjust to the new work culture and environment.

Areas of Common Interests for Indo-German Science Diplomacy

India and Germany share a lot of commonalities in the R&I landscape and can consider research collaborations for achieving mutual goals and providing scalable solutions for global challenges. Germany's R&I ecosystem broadly consists of universities and non-university research organisations, research-based companies and its federal and state research institutions. Germany's ~400 higher education institutions (which include 120 universities and >200 universities of applied research), with ~3 million students, offer a broad range of research activities, including basic research and applied research and development (R&D).

The non-university research institutions spread across Germany, focusing on fundamental and applied science research, are funded mainly by the Helmholtz Gemeinschaft, Max-Planck-Gesellschaft, Fraunhofer-Gesellschaft and Leibniz-Gemeinschaft, and Federal and Länder (State) governments. Apart from these institutions, private sector companies like Volkswagen, Bayer, BMW, Continental, Bosch, Siemens, etc., also invest heavily in R&I. Germany, due to its strong support for research, infrastructure and institutions and university-based cutting-edge research has emerged as one of the leading nations in R&I. One-third of Germany's R&D budget (~3.1% of the country's Gross domestic expenditure on research and development, GERD) is provided by the public sector and the remaining by the private sector.

S&T cooperation between India and Germany is implemented under an inter-governmental agreement on "Cooperation in Scientific Research and Technological Development" signed in May 1974. The Department of Science & Technology on the Indian side and the Federal Ministry for Education and Research (Bundesministerium für Bildung und Forschung, BMBF) from Germany are the nodal agencies for the overall coordination of the programme. Various modes are in place for the implementation and intensification of S&T cooperation between India and Germany, which include joint research projects between institutions and scientists, project-based personnel exchange programme with an emphasis on the exchange of young PhD scholars, joint workshops/symposia, networked partner research groups, mega-science projects like FAIR and DESY, etc.

To make this decade, India's Techade, powered by Jai Anusandhan and for AtmaNirbhar Bharat, India can foster cooperation with Germany in the National Mission areas, like green hydrogen, deep ocean exploration, quantum computing and in areas of emerging technologies like artificial intelligence, Internet-of-Things, 5G/6G wireless communication and electric vehicles, and in biodiversity, biosciences and human health. Both countries can join hands in exploring deep oceans for resources and develop deep-sea technologies for sustainable use of ocean resources. India and Germany have great potential to collaborate to achieve energy security and tackle climate change concerns. Cooperation in green hydrogen to leverage India's land mass and solar and wind energy potential to produce low-cost green hydrogen for export to the rest of the world must be considered on priority. In quantum computing, which promises a significant leap in computing power, cooperation can be considered in areas like R&D, translation and infrastructure generation.

Both countries could gain a lot by cooperating in establishing joint mega-science infrastructures in strategically important areas. Diplomacy can help the scientific fraternity in facilitating multilateral cooperation in mega-science projects and undertake peaceful research in domains that come under international law like Antarctica, Deep Oceans and Outer Space. Increased communication between scientists and policymakers, and the opening of strong collaboration channels, have enabled science diplomacy in resolving contentious issues and building confidence between the countries. Therefore, building a close relationship between scientists and diplomats is critical to achieving the objectives of science diplomacy.

Path towards Decarbonisation: UK Perspective

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Decarbonisation refers to the process of reducing carbon intensity. Generally, this involves decreasing carbon dioxide output per unit of energy generated. Reducing carbon dioxide emissions emerging from transport, power generation and other sectors of the economy is essential to meet global temperature standards set by the Paris Climate Agreement. This essay paints a picture of identifying the fundamental challenges concerning the current causes of greenhouse gas (GHG) emissions, potential opportunities for harnessing technologies to overcome the challenges and how science diplomacy and appropriate policy response can play a part in the UK context.

Current Emission

The Intergovernmental Panel on Climate Change (IPCC) has concluded that the current global warming trend has unequivocally been due to human activity. Rapid industrialisation and global growth have increased GHG emissions, particularly carbon dioxide, in the atmosphere at an alarming rate.[1] In addition to the IPCC, other research[2] shows that the first half trillion tons of carbon burnt in the last 250 years. On current trends, the next half trillion will be released into the atmosphere in less than forty years. An analysis of the National Oceanic and Atmospheric Administration (NOAA) indicates that the global average atmospheric carbon dioxide was 414.72 parts per million (ppm) in 2021, setting a new record high despite the continued economic drag from the COVID-19 pandemic. Data from NOAA[3] further suggests that the amount of carbon dioxide in the atmosphere (See green line Figure 1) has increased along with human emissions (grey line) since the

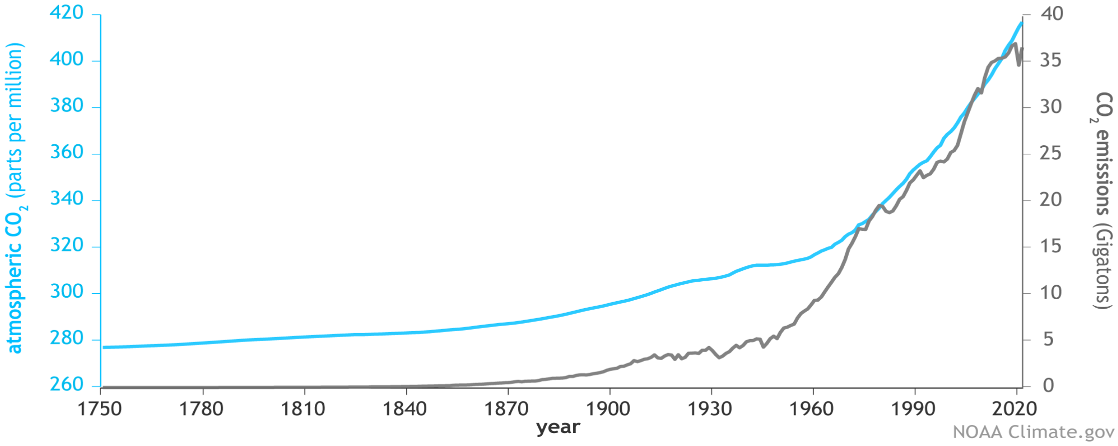

Figure 1. Atmospheric Carbon dioxide amount and emission trend (1750-2021) (Source: NOAA Climate.Gov graph 2022)

start of the Industrial Revolution in 1750. Emissions rose slowly to about 5 billion tonnes per year in the mid-20th century before escalating steeply to more than 35 billion tonnes per year by the end of the century.

In comparison with the global trend shown above, the UK's cumulative carbon dioxide emissions[4], which represent the total sum of carbon dioxide emissions produced from fossil fuels and cement production since 1750 (measured in tons), can be seen in Figure 2. It did not include land use change. However, a steep rise in emissions can be noticed clearly by the end of the last century.

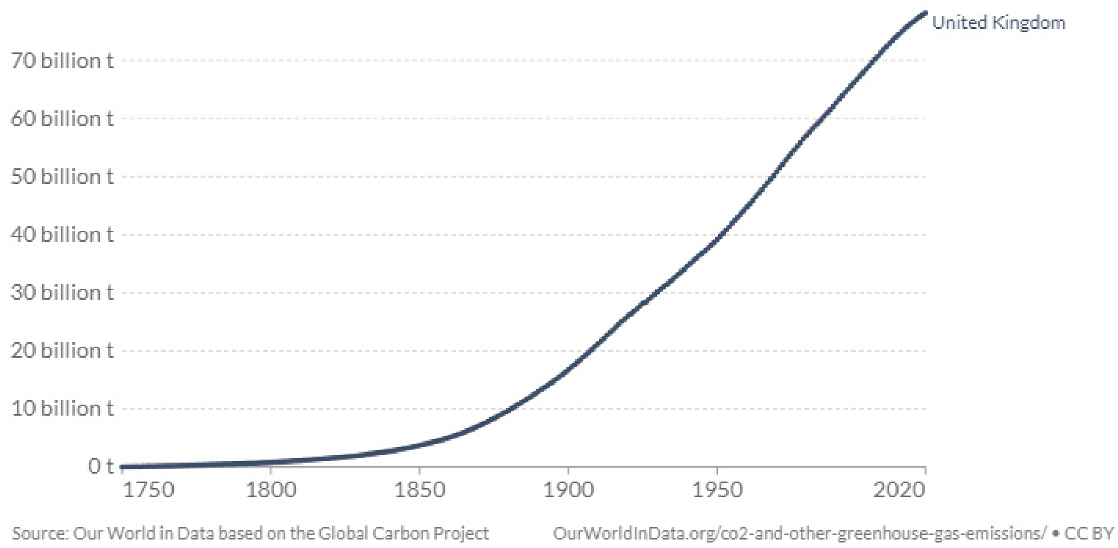

Figure 2. Cumulative carbon dioxide emission in the UK since 1750 (Source: Global Carbon Project 2021)

Among the GHGs, carbon dioxide accounts for three-quarters of the warming impact of emissions. It is the most persistent GHG, with a significant proportion of carbon emitted today remaining in the atmosphere for a century. The analysis of the interaction of carbon emissions and temperature rise over the century demonstrates that the pace of global warming is approximately proportional to the amount of carbon dioxide in the atmosphere. Such calculations mean we can estimate our carbon budget. The size of the carbon budget depends on (a) the temperature outcome and (b) the degree of uncertainty.

Currently, industrial processes account for 32% of emissions. It includes different production processes, such as the production of manufactured goods. Emission from buildings, such as the use of energy for electricity and heat generation for buildings, accounts for 18% of emissions. 16% of current emissions emerge from transport, which comprises energy used by cars, heavy goods vehicles, shipping and the aviation industry. 11% of current emissions pour from energy generations, this involves the production and supply of energy, and 10% of current emissions emanate from food and agriculture.[5]

Challenges

When the amount of carbon added to the atmosphere is greater than the amount removed, the level of carbon dioxide in the atmosphere increases. To keep temperature rise below 1.5 degrees Celsius, we must reach the net zero - the balance where carbon emitted and taken out of the atmosphere are equal. The IPCC estimates[6] that for achieving a 1.5 degrees Celsius target, the net carbon dioxide emissions would have to be reduced by up to 50% by 2030 on 2010 levels and reach a net zero level by around 2050. For a 2-degree Celsius limit, net zero emissions need to be reached soon afterwards. In addition, it would also require the depletion of other GHGs emissions, such as methane and black carbon, that remain in the atmosphere for shorter periods.

The biggest hurdle is that this transition would require extensive emission reductions from all sectors of the economy. Even if emission reduction is possible, carbon dioxide removal (CDR) is also required to reach net zero. In the power sector, further, development is needed for renewable energy storage and smart systems, carbon capture and storage (CCS) infrastructure and CDR methods. In the transport sector, increased efficiency and electrification of vehicles, the potential use of hydrogen fuel cells in vehicles, alternative fuels in aviation and shipping along with behavioural changes to reduce demand are desired. In agriculture, forestry and land use sectors, human diet change leading to reduced livestock numbers and associated methane emissions, increased soil carbon storage, afforestation, restoration of wetlands to store more carbon and decreased mineral nitrogen fertiliser use are essential. In the industrial sector, shift to low, zero or negative carbon emissions, for example, by using carbon-negative building materials (wood, carbonated aggregates), capturing carbon dioxide from cement manufacture, and usage of alternate heat sources such as hydrogen is required.

In residential and commercial buildings, improved insulation, utilisation of heat pumps and potential use of hydrogen to replace natural gas are preferred. In this aspect, one of the UK's biggest challenges is to decarbonise around 30 million existing buildings. Many of these are old, poorly insulated, and have carbon-based energy supplies. Even though renewable energy production has increased, there are some critical challenges, such as political barriers and the lack of policies and regulations for redeveloping existing buildings using renewable energy technologies.

Further, research and planning for the application of a suite of CDR methods are essential. In the waste sector, increased reuse and recycling, banning wastes containing biodegradable carbon from landfill and capturing methane gas are vital. Some important policies and strategies need to be adopted soon to implement the sector-wise decarbonisation process.

Net zero strategy in the UK has recently faced a legal challenge. On 18 July 2022, High Court ruled following a judicial review brought by Client Earth, Friends of the Earth and the Good Law Project that the government's net zero strategy was unlawful.[7] It was ruled illegal in two ways: First, not enough information to know that supporting nuclear power stations through this strategy would enable carbon targets to be met. Second, it failed to offer sufficient details on how many individual policies would cut emissions. These are the obligations under the Climate Change Act 2008. The net zero strategy will remain a government policy, and it has not been quashed, but the court ruling has posed a new dimension and a difficult task for the government. It could be a learning curve for India as well. The general principle is that any decarbonisation strategy should have due regard to the obligation of the relevant climate change act. Currently, the Climate Change Committee found that only 39% of the emissions cut are backed by credible policies. The policy response is also necessary for other challenges, such as the climate change impacts outside the geographical boundary. It could negatively affect UK trade and food supply and increase migration due to displacement and conflict in severely affected regions.

We need to understand our carbon emission output. If we seek to predict the trajectory of the carbon emissions output, there are four main components which will drive it according to the Japanese economist Yoichi Kaya[8], derived from the earlier work expressed by Paul Ehrlich of Stanford and John Holdren of Harvard, respectively and also referred by William Nordhaus.[9] The four components are population, per capita income, watts of energy required to produce a pound of income (energy intensity) and the carbon intensity of the energy required to produce a watt. This formula can be adapted for the UK as below:

Carbon dioxide emissions= Population X (Pound/Person) X (Watts/Pound) X (Carbon/Watts)

The population might drive energy demand, which leads to carbon emissions. It is unwarranted to control population growth for the sake of climate change mitigation. Per capita income is a variable and is tough to manage because everybody wants to be rich. So, population and economic growth are working against our climate goals. The third term in the above equation is the amount of energy required to produce a pound of income, which is crucial and should move in the right direction. The amount of energy required to produce a pound of income in a service economy is much lower than in a heavy industry economy. The fourth term is the amount of carbon emitted to produce each watt of energy. The third and fourth terms are related to energy intensity and carbon intensity, which we shall have to manage. But the challenge here is that the energy intensity of the economy and the carbon intensity of the energy mix needs to fall faster than the population and per capita income rise. It is a challenge for both UK and India. The International Energy Agency predicts that global energy-related carbon dioxide emissions will increase between now and 2040.[10] The above equation also suggests that the main driver of GHG emissions is economic growth. With no growth, temperatures would likely stay within 2.5 degrees Celsius by 2200.[11]

Technology for Decarbonisation

To decarbonise economies and overcome some of the challenges mentioned above, we require better technologies to achieve the goal. Bill Gates[12] put forward a list of technologies to achieve this goal, as follows: Hydrogen production without emitting carbon; Grid-scale electricity storage that can last a season; Electrofuels; Advanced biofuels; Zero carbon cement; Zero carbon steel; Plant and cell-based meat and dairy; Zero carbon fertiliser; Next generation nuclear fission; Nuclear fusion; Carbon capture, both direct and point capture; Underground electricity transmission; Zero carbon plastics; Geothermal energy; Pumped hydro; Thermal storage; Drought and flood tolerant food crops; Zero carbon alternatives to palm oil; Coolants that don't contain F-gases.

In UK, a review of options and costs for removing oil, coal and gas for electricity production has been carried out recently.[13] According to the UK-based Centre for Alternative Technology, if we swap fossil fuels for home solar panels, we need 49 million 3.5 kilowatts (kW) solar panel systems. The cost for it is 296 billion pounds. If we swap fossil fuels for wind turbines, we need around a total of 37000 offshore and onshore wind turbines and installing them would cost 72 billion pounds. If we swap fossil fuels for nuclear reactors, we need 14 nuclear plants, and its estimated cost is 77 billion pounds. These statistics are based on the UK's demand and existing supply of energy. The change in nuclear technology can reduce both the building cost and the waste problem of a nuclear plant. Lately, all nuclear power stations use the intense heat of an atomic reaction to create steam to drive a spinning turbine to generate electricity. The most common are pressurised water reactors (PWR). Recently, a new technology, molten salt reactor (MSR), has been unveiled. MSR has been built in Canada with a whopping cost of around 1.2 billion dollars, which is approximately five times cheaper than PWR. In this reactor, the radioactive elements, such as uranium or thorium, are held in a liquid sodium chloride solution. Molten salt also cools the core and transfers the heat into steam to drive turbines. Its great advantage is that it remains liquid at higher temperatures without pressurised containment and creates far less radioactive gas.

The technologies mentioned above that we need to meet net zero are not enough and require new policies so that we can demonstrate and deploy those inventions in the market as fast as possible.

The Implication of Decarbonisation for UK Policy

UK Climate Change Act 2008 has put in place legally binding emissions reduction targets and a framework for climate change mitigation and adaptation. Under the Act, the Committee on Climate Change was charged with advising on targets and carbon budgets and monitoring progress.

The UK's domestic emissions have decreased by about 40% from 1990, mainly due to a reduction in emissions from power generation. At the same time, Gross Domestic Product has grown by around 70%, and emissions arising from its consumption of goods and services, including those associated with imports, remain significantly higher than the 1990 level.

The Committee on Climate Change's 2022 Progress Report[14] concluded that the UK is not on course to meet its five-year carbon budget after 2022, and progress on reducing emissions from transport, buildings and agriculture are chief concerns. The report suggests that 'The Net Zero Strategy contained warm words on many of the cross-cutting enablers of the transition, but there has been little concrete progress'. The report also added, 'There remains an urgent need for equivalent action to reduce demand for fossil fuels to reduce emissions and limit energy bills'.

However, the UK is demonstrating leadership in the technologies required to reduce emissions and remove carbon dioxide from the atmosphere and offers a range of strategic and commercial opportunities.

Such actions could stimulate sectors of the UK economy working on green growth, including wind and solar power, advanced batteries and energy storage, electric vehicles, hydrogen, carbon capture and storage, and CDR technologies. According to the Office for National Statistics, the low carbon and renewable energy sectors are growing about three times faster than the wider economy in recent times.

Decarbonisation of economies would further reduce risks, such as river and surface water flooding from heavy rainfall, coastal flooding and erosion from sea level rise; higher temperatures, including effects on well-being; water shortages; impacts on the natural environment such as further declines in native wildlife, decreased soil quality, reduced traditional fish stocks; spread of invasive pests and diseases.

At a recent COP26 meeting, the UK proposed five themes for climate change action. These are adaptation and resilience for societies against climate change; nature-based solutions to protect ecosystems; ending reliance on fossil fuels; transitioning to electric vehicles; increasing investment in sustainable infrastructure, and greening finance. However, implementation of such actions has policy implications and requires science diplomacy to see its fruition globally.

Science Diplomacy and Policy for Decarbonisation

More science is essential, but science alone is not enough to either guarantee alternative technology for decarbonisation or determine where unconventional local technology should be harnessed. The policymaking organisations must listen and be responsive to new science. Policymakers also need to ensure that, as policy evolves, they are adequately enforceable. When an environmental policy builds on careful science and rigorously analysed data and facts, it can be pursued without fear of upsetting interested parties or overturning prevailing wisdom. However, science diplomacy can lead to an innovative solution. Science diplomacy can focus on scientific solutions, expertise, resources and tools for an international effort to solve environmental problems.[15] It has been viewed that all three dimensions of science diplomacy[16]: science in diplomacy, diplomacy for science and science for diplomacy are vital for scientific, technological and global as well as national level policy response to climate change.

A balanced and rational climate change policy must focus on both aspects, what is known and what is unknown about climate change and its impacts. A balanced policy considers two types of possible errors when chosen under uncertainty. The first type of error is known as 'false negative'. This error means a government fails to regulate when, in fact, there is a risk of serious and irreversible harm. The second type of error is called a 'false positive'. This error means a government decides to regulate a risk that is not realised. When we adopt a policy for a decarbonised economy based on the precautionary principle, we primarily focus on the cost of a false negative. On the other hand, a policy based on false positive error is a decision to regulate that turns out to have been wrong, in the sense that the probability or magnitude of harm was smaller than believed. These need to be examined carefully during the policymaking process.

Conclusion

The UK government has accepted the Climate Change Committee report. It means that low-carbon investment must scale up to £50bn a year in the UK. It has been recognised that the energy supply companies, transport, and the Built Environment, as a whole, need radical change. Parallelly, the restoration of nature is also critical. We have forgotten nature's paramount role in climate change mitigation, resilience, and adaptation. Many examples demonstrate how natural habitats such as peat, woodland and seagrass can absorb massive amounts of carbon. So, nature can play a vital part in the decarbonisation process.

More than 90 years ago, Thomas Edison, the inventor of the light bulb, said to Henry Ford, the owner of Ford Motor Company and Harvey Firestone, the manufacturer of the tire, partially made from oil, 'I would put my money on the sun and solar energy. What a source of power. I hope we don't have to wait until oil and coal run out before we tackle that.[17] Edison's motivation for harnessing renewable energy is very pertinent today. Bringing this within the environmental policy framework and using science diplomacy as a tool for climate decision-making should be a norm now.

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Open Science in Drug Discovery: Addressing the Gaps in Traditional Model of Developing New Medicines

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Does the name Linus Torvalds ring any bell? I would not be surprised if the answer is: No! Just to let you know, he developed a "free" operating system as a "hobby" in 1991, while he was a student at the University of Helsinki, which we know today as Linux. Torvalds might have championed Linux, but eventually, it was upgraded by additions and changes introduced by many individuals to its openly available source code. But what is the significance of this development when we are not talking about computer programs or software but an utterly different subject medicine? Before I start to draw the connections, let me make a disclaimer! I will use the term "drug" instead of "medicine" in the rest of the writing and do not confuse it with Cannabis, Cocaine, Ecstasy, and so on.

Now, back to the previous question, why have I started with "Linux" while the title says "drug discovery"? It is because of the philosophy behind "open-source" and "crowdsourcing". So, does a new drug developed using open-source models? Obviously, no. It is generally one hell of a closely guarded process with numerous IP protections. But it would have been best if drug discovery could follow open-source philosophy. We would have been able to afford drugs way more easily, at a much lower price, if not free as in the case of "Linux". Well, I must put a warning before we get over-excited. Drug development processes need access to wet labs and clinical trials and, finally, approval by the appropriate authorities, so the whole process is way more complicated than developing software!

Traditional Models of Drug Discovery & Development

The COVID-19 pandemic has evoked a lot of curiosity around vaccine and drug developments. How is a new vaccine made? How effective are the new drugs in treating COVID? It takes a lot of effort, time, and money to discover new medicines and finally produce and bring them to the market. Let me explain the traditional drug discovery process- a tried and tested model used for nearly 70 years by all the large Pharma companies. These companies, like GlaxoSmithKline, Johnson & Johnson, Pfizer, Novartis, etc., all operate mostly in-house while developing a new drug for any disease.

The R&D process pipeline, clearing the regulatory hurdles and finally bringing the life-saving treatment to the market, takes about 10-15 years and costs around $2.6 billion. But that is not the end; it further involves post-marketing monitoring and development costs which amount to around $300 million. According to estimates, an entire lifecycle of R&D of a new drug takes up to three billion per drug. So it is no wonder many life-saving drugs are expensive. But what about the cost of human lives? Can we just continue

The Drug Development Process

with the same old calculation of checks and balances, or should we start looking for alternative models? The need to update the traditional approach to drug development is more apparent when we consider that the cost of developing a new drug has increased exponentially in the last decade. Still, the total number of new drugs remained relatively constant on the output side.

Open Science in Drug Discovery

The good news is that the open and collaborative drug discovery models have started to take shape based on the open-source philosophy, also referred to as open science in a more generalised term. For example, Prof. Aled Edwards from the University of Toronto established a start-up Medicines4Kids (M4K) Pharma, in late 2017, along with his business partner Owen Roberts. The focus of M4K is to develop a new treatment for a rare, incurable, and fatal pediatric cancer called Diffuse Intrinsic Pontine Glioma (DIPG). They also founded another start-up, Medicines for Neurodegeneration (M4ND) Pharma. This one is dedicated to developing drugs for neurodegenerative conditions such as Parkinson's disease and amyotrophic lateral sclerosis. These companies are among the very few in the world of Pharma to employ an open science approach in their R&D strategy. Their drug development process is based on collaboration that emphasises the open sharing of data with partners and the public. COVID Moonshot is another grand open science experiment that aims to develop accessible and affordable antiviral drugs to combat SARS-CoV-2 infection. Moonshot is a non-profit open science consortium that started spontaneously in March 2020 through virtual collaboration. Around 150 experts from diverse backgrounds and fields joined hands for the Moonshot, crowdsourced ideas on novel molecular entities, used modelling techniques to evaluate effectiveness against the virus, and so on without claiming intellectual property. The first clinical trials of the identified drug molecules are expected to begin soon.

Open Science-Based Drug Discovery for Neglected Diseases

The Open Science approach to drug discovery is more prevalent in neglected disease areas, such as malaria, tuberculosis, etc. Big pharma companies are not interested in this domain as they are not profitable disease profiles for investment. Open Source Malaria project is engaged in finding cures for malaria. Guided by open source principles, all data from the project is available in the open domain, and anyone can contribute to the project. Open Source Pharma Foundation (OSPF) is another open-source drug discovery platform. OSPF received funding from the Tata Trusts, an India-based philanthropic group, in 2018. OSPF has successfully repurposed the generic diabetes drug metformin as a tuberculosis treatment and moved it into Phase 2B clinical trials. The development process of this repurposed drug is quite fast compared to the traditional ways, and the cost is reported to be remarkably low in contrast to an estimated cost of $2.6 billion typically needed to make a new drug. These successes give us hope for a better future. But many such open science-based drug discovery initiatives saw untimely closure as well. Open Source Drug Discovery (OSDD**)**, an initiative from CSIR, India, is one such example. The last updated event on the website of OSDD dates back to 2015. The publications listed on the site also date back to 2014. But failed initiatives are also essential to building a successful one, especially understanding the challenges in terms of costs, timelines, partner contributions, credit sharing, etc.

Funding of Open Science Projects

Another essential question is how open science-based projects are funded. A vast majority of funds for research comes from taxpayers' money in the Indian ecosystem. The government contributes almost entirely to R&D at public universities and institutions. The private sector has a minuscule percentage in R&D expenditure. Nowadays, crowdfunding is emerging as a viable alternative for funding scientific research. Crowdfunding is a known concept in the global north but is still in its infancy in the global south, including India. Experiment, USEED, Consano, etc., are a few online crowdfunding sites for scientific research.

A few universities and institutes have initiated their own online efforts. They utilise their alumni network for funding. Another approach is via open innovation models, where universities/ institutions can develop a formal collaborative partnership with industry and co-create knowledge. In such cases, IP-related queries are handled through various legal agreements. Open Innovation is a concept first introduced by Henry Chesbrough and is a widely used model in the R&D ecosystem.

However, when we are discoursing developing new drugs, the sheer volume of funding needed for such initiatives makes it harder to achieve entirely through crowdfunding. Therefore, such open science-based drug development projects are generally funded by NGOs or philanthropic trusts. For example, the COVID moonshot project is funded by Wellcome Trust UK, Bill & Melinda Gates Foundation, COVID-19 Therapeutics Accelerator (CTA), LifeArc, and crowdfunding as well. As mentioned previously, in the COVID Moonshot project, all collaborators contributed to the knowledge pool through an open platform without claiming any rights over intellectual property for the greater good of society. A few COVID Moonshot project participants are the University of Oxford, the University of Cambridge, the Weizmann Institute of Science in Rehovot, Israel, the University of Johannesburg, the Drugs for Neglected Diseases initiative (DND*i*) in Switzerland, and many more. Sai Life Sciences of India also contributed to this project in terms of chemical synthesis.

In conclusion, it will take time to create awareness and bring changes in the overall traditional models of developing new medicines. But open science and crowdfunding have a bright future and are the best way to look forward.

Science Diplomacy to Strengthen an Innovative Regulatory Agenda: Inputs from Medicines Regulatory Agencies

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Diplomacy employs dialogue and negotiation as elements of the established diplomatic infrastructure and the functions performed in diplomatic relations between states and on international forums. It can be an influential and versatile method to promote friendly relations and facilitate the development of favourable economic, cultural and scientific relations between states despite the existing differences or problems.[1]

Globalisation and increasing interconnectivity have demonstrated that diplomatic relations are not developed only at a bilateral level. States can also relate at a regional or global level, taking into account specific or common interests as well as their geographical location in a given region.

The complexity of issues such as environment, health, access to medicines and their impact on human lives on the global level has led to a specialisation in the diplomatic arena. We are no longer talking about discussion environments based purely on international politics. It has now become essential to document scientific knowledge and evidence in negotiation processes and the recognition of appropriate mechanisms for dialogue. Based on scientific knowledge, new working methods and greater confidence toward innovation in national regulatory systems can be generated. The universal language of science and innovation guided by academic knowledge and standards enables building constructive dialogue across states to overcome global challenges and crises. Likewise, cooperation and the exchange of good practices can be increased, positioning these issues as a priority in regional and international environments, making it possible to achieve International policy objectives and health self-sufficiency.

The difficulty in accessing medicines, pandemics and climate change, among others, are global challenges that impact each of our societies. That is why scientific knowledge, technology and innovation must be essential drivers for the development of society and its adaptability to the changing environment of international relations. A country's capacity to generate knowledge and technological innovation enhance its image in the international community. Science, technology and innovation have become vital elements of international relations as they are, in turn, components of economic progress and equitable and sustainable development of societies. They also provide scientific evidence for good governance, development of public policies and appropriate decision-making, allowing us to address the global challenges more quickly and effectively.

The establishment of a space for interaction between science, innovation and diplomacy is conducive to building a common ground for the scientific and diplomatic communities to build trust and mutual understanding. This process of cohesion between the two communities does not usually occur. So, the development of emerging diplomacy, with a framework of negotiation and dialogue based on scientific evidence, is transformative, beneficial and relevant to responding to the present and future challenges faced by the international community.

Much less well known is the interrelationship between science, innovation, the medicine regulatory environment and the diplomatic contribution to strengthening regional and global health governance, leadership and funding of projects and initiatives that foster cooperation between regulatory agencies. A multidimensional approach fostering the principles of anticipating, driving and translating innovation in the regulatory environment enables the participation of different actors (academia, industry and regulatory agencies, among others), driving viable policies and programs from the countries to the knowledge economy. Accordingly, the formalisation and expansion of cooperation and coordination mechanisms strengthen networks and collaborations between scientists and regulatory experts to increase the quality of good regulatory practices. There, too, the decision-making based on scientific pieces of evidence, in line with international standards, opens new markets and consequently achieves greater competitiveness at the global level. Moreover, strengthening and promoting the participation of developing countries in projects of regional or global impact promotes capacity building, access to resources and first-class infrastructure and the exchange of experts.

In the Latin American region, the interrelationship between science, diplomacy, technological innovation, and regulatory agencies for medicines and medical devices, should be analysed from a perspective that considers the existing diversity of regulatory frameworks. The development of an integrated and innovative regulatory agenda focused on the harmonisation of national regulations related to the marketing of drugs and medical devices, allowing decision-making based on the criteria of quality, safety and efficacy. Similarly, the possibility of assessing the risk-benefit ratio is strategic for adopting efficient, rapid procedures that allow for closer cooperation and coordination among national medicines regulatory authorities, directly impacting trade agreements, supply chains and timely access to medicines, vaccines, etc. A regional regulatory structure based on the construction of integration in the areas of health, access to medicines, accessibility to innovative products and greater production capacities at the regional level is essential to lead programs, resources and policies that improve access to health in the region.

Equally, the alignment of the regional regulatory systems advocating for a regional framework will have a direct impact on the modality of collective and diplomatic action vis-à-vis international actors in terms of the right to health. In September 2021, the member countries of the Community of Latin American and Caribbean States (CELAC) unanimously approved lines of action and proposals for a plan for self-sufficiency in health matters in Latin America and the Caribbean, a programmatic roadmap presented by the Economic Commission for Latin America and the Caribbean (ECLAC) for strengthening the production and distribution of medicines, especially vaccines, in the region's countries and reducing external dependence.[2] This document highlights the importance of strengthening convergence mechanisms between regulatory agencies for medicines. Convergence efforts within the region can facilitate communication, information sharing and accelerate the approval of quality and effective medical products.

The region already has developing work at the regulatory level promoting synergy and joint work, such as the example of the regional reference agencies.[3] These agencies were certified through an evaluation and qualification process based on the verification of indicators contained in the data collection tool of the Pan American Health Organisation (PAHO) and based on the recommendations of the World Health Organisation for the strengthening of regulatory agencies. In addition, the National Regulatory Authorities of the Region and the Pan American Health Organisation established the Pan American Network for the Harmonisation of Pharmaceutical Regulation (PARF Network) initiative, which supports the processes of harmonisation of pharmaceutical regulation in the Americas, within the framework of national and sub-regional health realities and policies and the recognition of pre-existing asymmetries.[4]

The regulatory, scientific and diplomatic environment must value the impact of regulatory sciences and scientific evidence in the anticipation of trends, which would enable the adaptability and updating of regulatory frameworks. It is imperative that our region, to achieve greater prominence at the global level, should immerse itself proactively and cohesively with innovative initiatives that articulate regional cooperation mechanisms in the regulatory environment. Taking the experience of other regions, we must advance in regional bloc processes through the existing regulatory compatibility or convergence, while maintaining our autonomy and the interests of each country. COVID-19 and its impact have demonstrated the strategic importance of increasing intra-regional trade, strengthening the health technology industry, regional pharmacovigilance systems, coordination mechanisms for the development of clinical trials and betting on mutual recognition of the results of clinical trials. Additionally, more than a romantic view of a common regulatory framework, there is a real need to balance competing interests from national regulatory agencies encouraging work coordination and expediting the exchange of key information about medicines and innovative medical products.

The regulatory sector has had to face a series of challenges to its traditional working methods. The implementation of flexibilities in its regulatory frameworks, the use of emergency use authorisation with a public health approach and the development of adaptive clinical trials have led to the generation of a series of data based on scientific evidence. At the same time, the creation of synergies for the genuine development of regional platforms or organisations that allow the dynamisation of our international regulatory cooperation networks is required.

According to Chapter II of the Plan for self-sufficiency in health matters in Latin America and the Caribbean: lines of action and proposals[2], the implementation of a regional clinical trials platform was listed as one of the main lines of action in the document. To advance in this challenge, it is necessary to promote joint reviews of applications for conducting clinical trials among national regulatory agencies. A platform that prioritised the collection and sharing of information on medical products helps to build strong partnerships between ethics committees and regulators of member states. For the region to become more active in ensuring the procurement of medical supplies and health sector regulations with emphasis on public purchases, timely access to accurate and adequate information should be reinforced. Therefore, collaboration on inspection of drug manufacturing sites, access to and network of the services available in quality control laboratory services within national regulatory authorities will generate consistency in medical products evaluation, thereby enhancing the region's scientific and innovation development.

The presence of a regulatory body for Latin America represents a unique strategy to build regulatory capacities and contribute to the development of regulatory science and innovation in the 21st century. The strong performance of regional integration initiatives to promote better health achievements will depend on the dynamic relationship between the diplomatic and scientific dimensions. It will require administrative, infrastructural and influence on member states to create an autonomous new regulatory governance structure for medicines and medical devices. However, there are practical challenges like operational norms and procedures, sustainable financing, political will and regional leadership to overcome. Scientists, regulators and diplomats must be aware of the impact and exercise of their respective functions. Science diplomacy and regulatory sciences should be in closer relation to promote trust-building transformative agenda and tools. Regulatory science offers the analytical focus on how regulations are successful and includes their translation into regulatory practice. This analytical and science-based approach in support of best practices and institutional governance at a global and regional level is a crucial resource for diplomats and government officials. Likewise, the interrelation between knowledge diplomacy, regulatory sciences, innovation and access to new technologies become tools for the region's participation in international forums and the sustainability and development of the health of our societies.

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Ocean Youth Ambassadors Promote Science Diplomacy in the Atlantic Basin: A New Generation Nurtures Connections Between Research, Policy and Community

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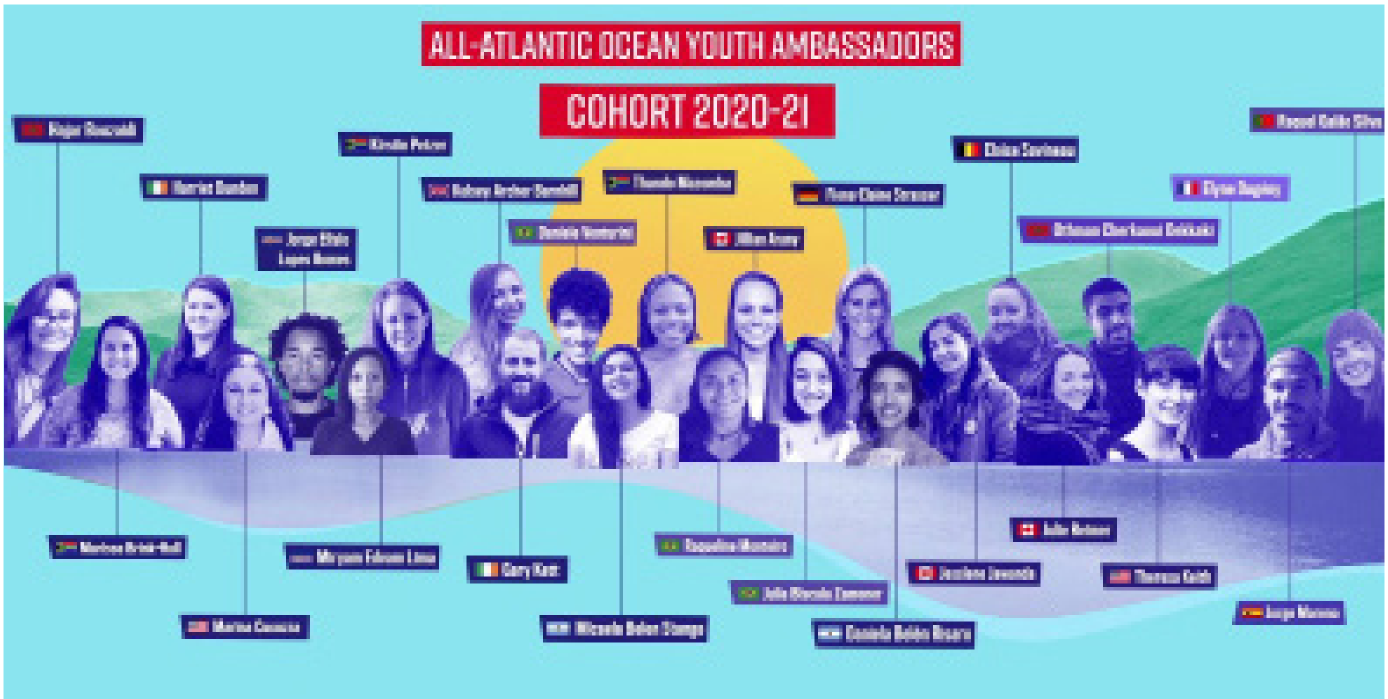
Introduction

The evolution of science diplomacy has been pivotal to progress in ocean sciences. Collaboration and effective communication have increased our understanding, protection and valuation of the ecosystem services and economic opportunities that exist across the Atlantic basin. Technology has improved connectivity between Atlantic nations, and a generation of informed, impassioned, and driven ocean professionals is emerging from the structures created through these collaborative efforts and shared visions. The All-Atlantic Ocean Research Alliance was initially built upon calls from the European Union (EU) member states and stakeholders for increased cooperation in marine infrastructure, research and innovation, which drove the Atlantic Maritime Strategy in 2011 and the Atlantic Action Plan in 2013. It led to the co-signing of the Galway statement by the EU, Canada and the USA with the joint aim of aligning efforts in ocean observation, increasing our understanding of ocean processes and promoting sustainable resource management. Four years later, the Belém statement was co-signed, expanding the cooperative network to South Africa and Brazil. Continued diplomatic efforts, now with a proven record of collaboration, communication and progress, brought about the integration of Argentina (2018), the Republic of Cabo Verde (2018), and the Kingdom of Morocco (2020), leading to the signing of the Azores Declaration of All-Atlantic Research & Innovation for a Sustainable Ocean in 2021. It was largely seen as an exemplary and tangible example of a global approach to multilateral cooperation in research and innovation, strengthening ties between science, communities, stakeholders, and policymakers from "pole-to-pole" around the Atlantic basin. A pivotal element of the All-Atlantic Ocean Research Alliance is the All-Atlantic Ocean Youth Ambassadors programme. This programme enables cohorts of early career ocean professionals (ECOPs) to become actors of change in their community, elevate youth voices, bring their research into policy discussions, and promote ocean stewardship in its many forms. This programme encourages the building and strengthening of the networks between researchers and other ocean professionals in a multicultural, multidisciplinary and multidimensional space, utilising local and global actions.



The 2020-2022 cohort of All-Atlantic Ocean Youth Ambassadors, 26 young adults from 16 nations surrounding the Atlantic Ocean.

Science Diplomacy Workshop

On 11 July 2022, the All-Atlantic Ocean Youth Ambassadors organised a workshop on Science Diplomacy across the Atlantic Ocean, hosted at the Embassy of the Federal Republic of Germany to the USA in Washington, DC. The focus of this event was to explore best practices concerning the role of science and innovation in the exploration and sustainable development of the Atlantic Ocean and the international collaborative efforts across and along the ocean basin. This event was held as a part of the All-Atlantic Ocean Youth Ambassador (AAOYA) Summer School in Washington, DC, during the All-Atlantic Ocean Research and Innovation Alliance Forum co-hosted by Brazil and the United States over two events. This forum resulted in the signing of the All-Atlantic Ocean Research and Innovation Alliance Declaration, committing its signatories to work together in facing and overcoming the challenges of sustainable ocean development and realising the great potential of international collaboration. The workshop event was welcomed by Evelina Santa-Kahle, Counsellor & Deputy Head, Science and Technology at the German Embassy, and introductory remarks were given by the AAOYA coordination team, Lavinia Giulia Pomarico, Jan-Stefan Fritz and Wendy Namisnik. Evelina set the scene for the day by remarking on our shared connectedness to the ocean and the resulting duty to join forces across borders.

The first session featured a panel discussion on ‘The potential of science diplomacy, international cooperation and the ocean’, moderated by Gary Kett (AAOYA, Ireland) and Thando Mazomba (AAOYA, South Africa). Invited panellists were distinguished guests; Amanda Netburn - Assistant Director for Ocean Science and Technology, White House Office of Science and Technology Policy, Kirsten Sarri - President and CEO, National Marine Sanctuaries Foundation and Florent Bernard - Counsellor for Research & Innovation, Delegation of the EU to the USA. The moderators facilitated conversations on topics such as “success stories in ocean science diplomacy”, “the needs and challenges of the science diplomacy community”, and “methods of building trust to foster collaboration and uptake of science”. Panellists gave informed insight coming from personal and professional experiences. They articulated success stories that inspire the community to continue in their efforts, for example, the United Nations Conference of Parties in 2016 as a turning point in international recognition and agreement on climate action; the formation of the UN Decade of Ocean Science for Sustainable Development; the advancements in media portrayal of climate issues and the increase in climate conversations amongst the wider public.

The first panel of the AAOYA Science Diplomacy workshop discussing the value and needs of science diplomacy and the potential for international cooperation across the All-Atlantic.

After some thoughtful contributions on these topics, discussing their strengths and weaknesses and areas to be improved upon for future efforts, the topic turned to "top-down structural or scientific needs of the science diplomacy community, and the required commitments that can be made to meet them", as posed by Thando Mazomba. Panellists spoke on the need for wide distribution and access to the internet as a right and a requirement for active citizenship and democratic participation. They highlighted the importance of societal justice and inclusion, that hearing all voices is key to their involvement in decision-making and reducing inequity across the board, needing diplomacy to act, not only at different levels but in different spheres too. To this, Kirsten proposed the question of if there is space within politics/diplomacy to push the limits on the overlapping economy, culture, science - more importantly, applicable science. Naturally, this spurred a lively and engaged discussion from the audience members, All-Atlantic Ocean youth ambassadors, dignitaries and representatives from various organisations and governments, who all expressed valuable insights and experiences on progress made so far and visions looking ahead.

The second-panel discussion titled 'The Atlantic Alliance and the potential for science and innovation cooperation into the future' was moderated by Othman Cherkaoui Dekkaki (AAOYA, Morocco) and Sigi Gruber

Panel 2 at the AAOYA Science Diplomacy workshop discussing the potential for science and innovation cooperation in the future and what lies ahead for the Atlantic Alliance.

(Head of Unit Retd, DG Research & Innovation, European Commission). The panel consisted of esteemed guests, Maria Zaira Turchi - Director for Institutional Cooperation, Brazilian National Council for Scientific and Technological Development - CNPq, Gilbert Siko - Director of Marine & Polar Research, Department of Science & Innovation, South Africa, and Liisa Peramaki - Director, Ocean Decade at Fisheries and Ocean Canada. The panellists spoke of their journey in working together in joining the All-Atlantic Alliance, the challenges and opportunities that lie within international cooperation and the progress that can be and has been made with increased diplomatic efforts based on scientific endeavours with regards to the Atlantic Ocean. This conversation also featured valuable input from the experiences and opinions of the audience participants. Speakers discussed how they would like to see research and innovation be fostered in the future, the value of Findable Accessible Interoperable and Reusable (FAIR) data and the importance of multi-stakeholder involvement, particularly on the local and community level.

Conclusion

The conversations in both panels received relevant input from audience members, distinguished guests, and participants. Overall, the discussions that ensued proved engaging and thought-provoking. It is evident that concerted efforts are being made across the Atlantic basin to ensure that cooperation, dialogue and agreements can persist, that efforts made together are stronger than the sum of each nation's efforts alone, and that inclusion and diversity across cultures and generations is key to ensuring the continuation, and improvement of an All-Atlantic community that is effective and impactful in its actions. The youth voices at the workshops expressed their concern about how much more needs to be done, to achieve the tasks ahead for climate and ocean protection. Science diplomacy was hailed as a great connector and invaluable tool for our development as a global community.

With this workshop, the All-Atlantic Ocean Youth Ambassadors showcased their understanding of the value of Science Diplomacy. It was reaffirming to witness an enthusiastic group of early career ocean professionals demonstrate their intricate appreciation for multi-generational, multi-cultural and socio-economic considerations in their approach to tackling global issues and enacting local change. Guest speakers provided a framework of examples, challenges and opportunities for future efforts in research, policymaking, and outreach, as well as in international cooperation. Recommendations touched on the building of trust between all actors involved in decision-making and those impacted by such decisions - for *scientists* to develop their effective communication practices, utilising ocean literacy tools to increase public awareness and support for pro-environmental policies, and for *policymakers* to put scientific evidence at the forefront of decision-making to ensure policies implemented can have an effective output. The future of the Atlantic Alliance looks promising with increased calls for further cooperation and integration of research and innovation. A deep source of optimism and hope can be found in the great appetite in youth groups for increasing progress in ocean sciences, climate action, nurturing strong bonds in diplomacy for the furtherance of global security and development.

All-Atlantic Ocean Youth Ambassadors with some of their panel guests following deep conversations on the future of science diplomacy, international cooperation and ocean science.

A Course on Science Diplomacy by AAAS-TWAS 2022

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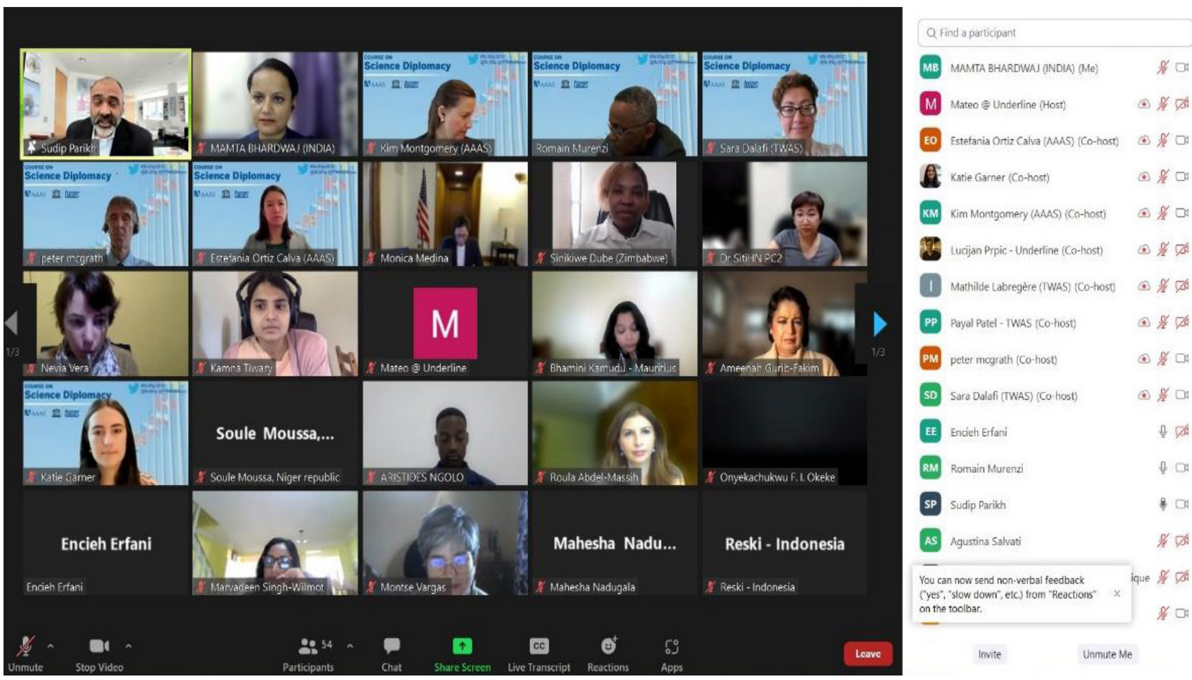
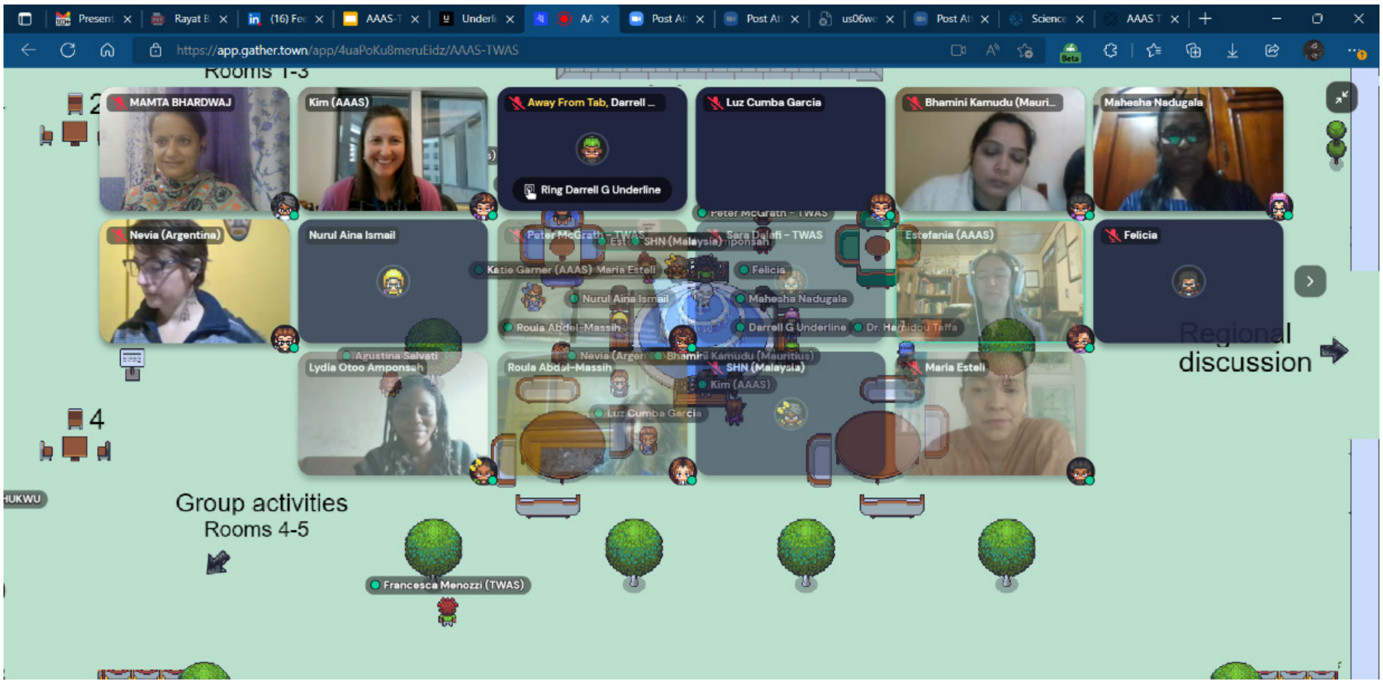
Introduction

The American Association for the Advancement of Science (AAAS), United States and The World Academy of Sciences (TWAS), Italy have partnered since 2011 to organise a week-long summer course at the TWAS headquarters in Trieste, Italy. This was the ninth edition (2022) of the AAAS-TWAS course on Science Diplomacy held virtually from 25 July 2022 to 3 August 2022. For the second year in a row, the organisers experimented with a new format whereby attendees participated in pairs comprising of an early career scientist and a colleague from the diplomatic or policymaking arena. The event was organised on the Zoom platform and Gather Town. The course started with the welcome remarks by **Kim Montgomery**, Director of International Affairs and Science Diplomacy (AAAS), **Romain Murenzi**, Executive Director, The World Academy of Sciences (TWAS) and **Sudip Parikh**, CEO, American Association for the Advancement of Science (AAAS).



Glimpses of Participants on day 1 (Zoom platform)

The platform, namely '*Gather Town*', which was deployed for the first time to make the online course more instructional and engaging, was the most intriguing aspect of the course which was developed by Underline. Each participant was instructed to select a distinct *'Avatar,'* (To be selected from the list provided by the platform only) so that they are easily identifiable, and not to change it over the entire duration of the course. To familiarise participants with the programme, a science diplomacy quiz competition was conducted during the introductory session on the first day, with questions hidden in various corners of the platform. The participants were expected to congregate at 'Gather Town' to discuss the day's conclusion at the end of the day reflection and upcoming activities with their pairs and fellow participants.



View of Gather Town Platform during the course

This year saw the participation of 50 candidates from various countries like India, Sri Lanka, Mauritius, South Africa, Brazil, Malta, Nigeria, Egypt, United States of America, Indonesia, Malaysia, Iran, West Indies, etc. More than twenty distinguished experts and practitioners provided their invaluable contributions by sharing their expertise and experience throughout the course. On the inaugural day, the Keynote speaker was **Ameenah Gurib-Fakim,** former president of Mauritius, and she spoke on the crucial issues of sustainable growth and climate change in South Asia and Latin America. She further added that to meet the development challenges, the nations must bridge the gap between research and policymaking, educating and attracting the youth to research and development.

The prominent speakers of the entire course were **Maurizio Bona**, former Senior Advisor, Relations with Parliaments and Science for Policy, CERN, **Margaret Donoghue,** Country Head US at CSIRO (Commonwealth Scientific and Industrial Research Organisation), Australia, **Ronit Prawer**, Director Science and Innovation Network, Eastern USA, British Consulate General in Boston, Massachusetts, USA, **James Hammond**, Director, Mount Paektu Research Centre; Assistant Dean, Recruitment and Retention, School of Science, Department of Earth and Planetary Sciences, Birkbeck, University of London, **Exequiel Ezcurra**, winner of 2020 AAAS Award for Science Diplomacy; professor at University of California Riverside, former Director of the University of California Institute for Mexico and the United States, **Jan Marco Müller**, Coordinator for Science Diplomacy at DG Research and Innovation of the European Commission, **Yousuf Al-Bulushi**, Science Advisor, Ministry of Foreign Affairs of Oman, **Soledad Quiroz Valenzuela**, Vice President for Public Policy, International Network for Government Science Advice (INGSA), etc.

Through the talks and plenary sessions, the speakers and moderators encouraged bilateral and multilateral collaborations between the countries to address the real challenges such as climate change, educations system, Sustainable Development Goals (SDGs), global warming, health sector, misinformation and disinformation in science, agriculture, scientific advice in environmental issue, scientific and research infrastructure, a career in science diplomacy, and through science diplomacy. Another interesting fact of this year's course was the interaction with the last (2021) year alumnus of the course. The main objective of the discussion was to promote interaction between the pairs with previous course alumni to discuss diverse topics related to science diplomacy from their region's perspectives.

Learnings from the Course

Some of the learnings and take home from the course are:

- Establishment of centralised science communication offices is the need of the hour in all countries and their interlinking is most crucial for diplomacy through science.
- For awareness and popularisation, science diplomacy modules should be introduced in all domains of science, technology, engineering and mathematics.
- A dedicated fund should be allocated for science communication and society engagement by respective science agencies of the nations.
- The institutional capacity for science diplomacy must be built to explore and implement science diplomacy initiatives, especially in developing countries.
- The nations with common problems and interests need to collaborate more efficiently, promote technologies, conduct effective policy-level discussions and implementation, nurture scientists, and increase mobility in international funding for noble causes.
- To achieve SDGs, climate change and foster international collaborations and partnerships, the need for highly skilled and trained researchers, collaborative trade, attracting high-value manufacturing and evidence-based policy formulations and implementation are the crucial aspects.
- The prestigious organisations like AAAS and TWAS should organise such events in various countries to promote science for diplomacy and diplomacy for science. This will strengthen the networking and relation between the nations and encourage the science diplomats to collaborate.

This year's course was the second batch for which applications were invited in pairs. This idea of pairs was adopted to promote networking through science diplomacy and encourage them to work in a collaborative mode in future too.

News

Manthan: India's Exclusive Platform to drive R&D collaboration with the industry

The Office of the Principal Scientific Adviser (PSA) to the Government of India (GoI) announced the launch of the Manthan platform, which aims to promote collaboration at scale between industry and the scientific research and development ecosystem to help meet India's sustainability goals in alignment with the UN defined Sustainable Development Goals (SDG) charter. The platform will facilitate knowledge transfers and interactions through Information Exchange Sessions, Exhibitions, and Events to develop a framework for future science, innovation, and technology-led growth. This platform will empower us to scale up the interactions among stakeholders, facilitate research and innovation, and share challenges in various emerging technologies and scientific interventions, including those that make a social impact. The launch commemorates India's 75 years of independence – Azadi ka Amrit Mahotsav and presents an opportunity to bring national and global communities closer to India's

MoUs Signed

India-Namibia sign an MoU on wildlife conservation and sustainable biodiversity utilisation

The Indian-Namibian Governments inked a Memorandum of Understanding (MoU) on wildlife conservation and sustainable biodiversity utilisation, on 20 July 2022, for establishing the cheetah into the historical range in India. The main thrust areas of MoU are: a) Biodiversity conservation with a specific focus on conservation and restoration of cheetah in their former range areas from which they went extinct, b) Sharing and exchange of expertise and capacities aimed at promoting cheetah conservation in two countries, c) Wildlife conservation and sustainable biodiversity utilisation by sharing good practices in technological applications, mechanisms of livelihood generation for local communities living in wildlife habitats, and sustainable management of biodiversity, d) Collaboration in areas of climate change, environmental governance, environmental impact assessments, pollution and waste management and other areas of mutual interest, and e) Exchange of personnel for training and education in wildlife management, including sharing of technical expertise, wherever relevant.

AAI signs MoU with Sweden to facilitate smart and sustainable aviation technology collaboration

Airports Authority of India (AAI) and LFV Air Navigation Services of Sweden (LUFTFARTSVERKET) signed an MoU on 26 August 2022 at the Corporate Headquarters of AAI in New Delhi. This MoU will play a crucial role in furthering government-to-government engagements between India and Sweden in the Aviation sector in addition to other existing engagements such as sustainability, healthcare, innovation, energy, infrastructure, etc. This MoU shall pave the way for the bilateral exchange of aviation expertise and technology between the two countries. It will allow Indian companies to accelerate growth while leveraging Swedish innovation and expertise. The main elements of the MoU are: a) Exchange of aviation knowledge and technical transfer program, b) Promote close and friendly relations between the two agencies, c) Aim to expand technical cooperation in airports, d) Support the development of a safe, secure, sustainable, and efficient aviation sector and e) Positive contributions in promoting bilateral and international trade.

MoU for S&T cooperation between CSIR, India and BCSIR, Bangladesh

In a boost to S&T cooperation between India and Bangladesh, Council of Scientific and Industrial Research (CSIR), India and Bangladesh Council of Scientific and Industrial Research (BCSIR) signed a cooperation MoU and exchanged it on 6 September 2022 in New Delhi. The collaboration under the 2022 MoU shall be executed through the exchange of S&T information, materials and scientists/researchers/scholars; joint S&T seminars/workshops and training courses; joint research projects; use of each other's major facilities; technology partnership/transfer; twinning of institutions for capacity development

Announcements ////////////////////////////

Call for Special Issue: "Gender and Socially-Inclusive Approaches to Technology for Climate Action"

Submission deadline: 17 February 2023

Further information at:

https://www.mdpi.com/journal/sustainability/special_issues/Gender_and_Socially_Inclusive_Approaches_to_Technology_for_Climate_Action

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Call for Proposals

India Science Research Fellowship (2022-23)

Last Date: October 15, 2022

Further information at: https://dst.gov.in/sites/default/files/ISRF%20Call-2022.pdf

Asean-India Research Training Fellowship

Last Date: October 30, 2022

Further information at: https://aistic.gov.in/ASEAN/aistdfFellowship

Indo-Russian S&T Cooperation-Joint Call 2022

Last Date: October 31, 2022

Further information at: https://dst.gov.in/sites/default/files/Joint%20Call%202022.pdf

India-U.S. Collaborative Vision Research Program

Last Date: November 8, 2022

Further information at: https://dbtindia.gov.in/sites/default/files/FOA%20Indo-US%20Vision%20Research%202022%20with%20Annexure%20I.pdf

Swiss Government Excellence Scholarships

Last Date: November 11, 2022

Further information at: www.sbfi.admin.ch/scholarships_eng

CEPI's Open Calls for Proposals

Last Date: December 31, 2022

Further information at: https://dbtindia.gov.in/sites/default/files/CEPI%27s%20Open%20Calls%20for%20Proposals.pdf

Forthcoming Events

UT Austin Portugal 2022 Annual Conference: International S&T Partnerships: Platform for Science Diplomacy

Date: October 19, 2022

Further information at:
https://utaustinportugal.org/2022-annual-conference/

Open World Conference 2022

Date: November 10–11, 2022

Further information at:
https://www.science-diplomacy.eu/events/open-world-conference-2022/

14th Canadian Science Policy Conference (CSPC 2022)

Date: November 16–18, 2022

Further information at:
https://sciencepolicy.ca/conference/cspc-2022-call-for-panel-proposals/

World Science Forum 2022
Date: December 6–9, 2022

Further information at:
https://www.science-diplomacy.eu/events/world-science-forum-2022/

World Science Forum 2022
Date: December 8–9, 2022

Further information at:
https://globalyoungacademy.net/events/world-science-forum-2022/

This Science Digest is open to new ideas, valid criticism and constructive feedback. If there is any science diplomacy/ policy related event which requires wider outreach, please share it with us. We welcome your articles/ feedback/ suggestions at scidip@niscpr.res.in

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