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RIS Science Diplomacy News Alert is your fortnightly update on Indian and global developments in scientific research, technological advancements, and G-20, global challenges, science diplomacy, policy and governance. The archives of this news alert are available at <https://fisd.in/en/alerts-archives>. Please email your valuable feedback and comments to science.diplomacy@ris.org.in.

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SCIENCE & TECHNOLOGY

GLOBAL

CRISPR Gene Editing for better forest trees

Using CRISPR technology, researchers at North Carolina State University have bred poplar trees with reduced lignin content, leading to a more efficient, sustainable fiber production. Their work could revolutionize the pulp and paper industry while reducing its carbon footprint. They have launched a startup, TreeCo, to continue this innovative work. The team used predictive modeling to set goals of lowering lignin levels, increasing the carbohydrate-to-lignin (C/L) ratio, and increasing the ratio of two important lignin building blocks – syringyl to guaiacyl (S/G) – in poplar trees. The team utilized a machine-learning model to predict and sort through almost 70,000 different gene-editing strategies targeting 21 important genes associated with lignin production – some changing multiple genes at a time. The process led to the identification of 347 strategies; more than 99% of those strategies targeted at least three genes. From there, the researchers selected the seven best strategies that modeling suggested would lead to trees that would attain 35% less lignin than wild, or unmodified, trees; C/L ratios that were more than 200% higher than wild trees; S/G ratios that were also more than 200% higher than wild trees; and tree growth rates that were similar to wild trees. From these seven strategies, the researchers used CRISPR gene editing to produce 174 lines of poplar trees. After six months in an NC State greenhouse, an examination of those trees showed reduced lignin content of up to 50% in some varieties, as well as a 228% increase in the C-L ratio in others. The efficiencies found in fiber production could reduce greenhouse gases associated with pulp production by up to 20% if reduced lignin and increased C/L and S/G ratios are achieved in trees at industrial scale.

Highly efficient, low-cost “green” hydrogen

Researchers from Tel Aviv University have succeeded in producing “green” hydrogen using green electricity — The hydrogen is produced without air pollution, with a high level of efficiency, utilizing a biocatalyst enzyme. An electrode provides energy instead of the sun. The researchers used a hydrogel (a water-based gel) to attach the enzyme to the electrode, and were able to produce green hydrogen using a biocatalyst, and with over 90 percent efficiency; that is, over 90 percent of the electrons introduced into the system were deposited in the hydrogen without any secondary processes. They soaked the electrode in the gel, which contained an enzyme for producing hydrogen, called hydrogenase. The gel holds the enzyme for a long time, even under the electric voltage, and makes it possible to produce hydrogen with great efficiency and at environmental conditions favorable to the enzyme — for example, in salt water, in

contrast to electrolysis, which requires distilled water. Another advantage is that the gel assembles itself — you put the material in water, and it settles into nanometric fibers that form the gel. Tests of the gel with two other enzymes, in addition to the hydrogenase, proved that it was able to attach different enzymes to the electrode.

mRNA technology to develop powerful malaria vaccine

Research team from Australia and New Zealand has developed an mRNA-based vaccine that can effectively target and stimulate protective immune cell responses against the malaria-causing parasite Plasmodium in preclinical models. The mRNA vaccine (that can encode an entire malaria protein) has been combined with an adjuvant which targets and stimulates liver-specific immune cells. This additional ingredient helps localise the RNA vaccine response to the liver, a key site in preventing the parasite from developing and maturing in the body. The approach relies on tissue-resident memory T-cells, that halts malaria infection in the liver to completely stop the spread of infection. The research team is now working towards taking the vaccine into human clinical trials, which they expect to take several years.

Energy-storing supercapacitor from ancient materials

MIT researchers have used cement and carbon black to develop a supercapacitor that could eventually be incorporated into the concrete foundation of a house, where it could store a full day's worth of energy while adding little (or no) to the cost of the foundation and still providing the needed structural strength. The researchers also envision a concrete roadway that could provide contactless recharging for electric cars as they travel over that road. The team introduced carbon black -- which is highly conductive -- into a concrete mixture along with cement powder and water, and letting it cure. The material is then soaked in a standard electrolyte material, such as potassium chloride, a kind of salt, which provides the charged particles that accumulate on the carbon structures. Two electrodes made of this material, separated by a thin space or an insulating layer, form a very powerful supercapacitor. The process is easily reproducible, with materials that are inexpensive and readily available anywhere in the world. And the amount of carbon needed is very small -- as little as 3 percent by volume of the mix -- to achieve a percolated carbon network. The team calculated that a block of nanocarbon-black-doped concrete that is 45 cubic meters in size -- equivalent to a cube about 3.5 meters across -- would have enough capacity to store about 10 kilowatt-hours of energy, which is considered the average daily electricity usage for a household. The team demonstrated the process by making small supercapacitors, about 1 centimeter across and 1 millimeter thick, that could each be charged to 1 volt. The system is very scalable, as the energy-storage capacity is a direct function of the volume of the electrodes.

INDIA

Campus of IIT Delhi in Abu Dhabi

A Memorandum of Understanding (MoU) has been signed between the Ministry of Education and Abu Dhabi Department of Education and Knowledge (ADEK), and the Indian Institute of Technology Delhi (IIT Delhi) to establish 1st campus of IIT Delhi in Abu Dhabi, as part of internationalization of India's education. IIT Delhi - Abu Dhabi will complement the academic, research and innovation ecosystem in Abu Dhabi through collaboration with key players such as Mohamed bin Zayed University of Artificial Intelligence, Khalifa University, New York

University Abu Dhabi, Technology Innovation Institute, and Hub71 to offer complimentary programs, conduct cutting edge research, and advance the local startup ecosystem. The IIT Delhi - Abu Dhabi campus is expected to launch its academic programs in 2024. IIT Delhi has been a frontline contributor to India's R&D ecosystem in sectors ranging from defense, healthcare, and rural development, to transportation, IT, and software.

'India AI' and Meta, India sign MoU on AI & Emerging Technologies

'India AI' – an IBD under Digital India Corporation and Meta, India have signed an MoU for collaboration and cooperation in the field of Artificial Intelligence & Emerging Technologies including to make Meta's open-source AI models available for use by Indian AI ecosystem. This partnership will tackle large-scale challenges by leveraging cutting-edge AI technologies like Llama and other open-source solutions, strengthen India's digital leadership and help to ensure AI tools are built for India's unique needs. Leveraging Meta's AI research models like LLaMA, Massively Multilingual Speech, and No Language Left Behind, the partnership will focus on building datasets in Indian Languages to enable translation and large language models, with priority given to low-resource languages. This effort will foster social inclusion, improve government service delivery, and spur innovation using large language models, Generative AI, cognitive systems, and translation models. 'India AI' and Meta will strive to enhance accessibility to AI compute resources for researchers, startups, and organizations with limited resources and promote responsible AI practices through the collaborative development of comprehensive tools and guidelines.

ISRO launches PSLV-C56 with 7 foreign satellites.

The Indian Space Research Organisation (ISRO)'s Polar Satellite Launch Vehicle (PSLV) C56 lifted off carrying a payload of seven satellites, early on July 30. The highlight of the mission was ISRO's successful launch of Singapore's DS-SAR satellite (360 kg), a result of fruitful collaboration between the Government of Singapore's Defence Science and Technology Agency and ST Engineering. Alongside DS-SAR, the PSLV-C56 carried six co-passenger satellites, each with its unique scientific purpose and technological objectives. The DS-SAR satellite is destined for a near-equatorial orbit (NEO, 535 kms) at 5 degrees inclination and an altitude of 535 km. Its sophisticated imaging capabilities are set to support vital sectors such as defense, surveillance, agriculture, urban planning, and disaster management within Singapore's government agencies. Six co-passenger satellites built by various agencies in Singapore were also launched - (1) VELOX-AM: A compact technology demonstration microsatellite (2) ARCADE: An experimental satellite dedicated to studying Atmospheric Coupling and Dynamics (3) SCOOB-II: A 3U nanosatellite carrying a technology demonstrator payload (4) NuLLIoN by NuSpace: An advanced 3U nanosatellite fostering seamless IoT connectivity in both urban and remote locations, (5) Galassia-2: A 3U nanosatellite designed for low earth orbit, contributing to space exploration and scientific research. (6) ORB-12 STRIDER: A satellite developed through international collaboration. After deploying the satellites, the PSLV's fourth stage is planned to maneuver itself down to a circular orbit with an altitude of about 300 km in an experiment to reduce space debris. [More details here.](#)

G-20 AND GLOBAL CHALLENGES

G20 Energy Transitions Working Group Meeting

The 4th and last Energy Transitions Working Group Meeting, held under India's G20 presidency, came to a successful conclusion in Goa on July 20, 2023. The discussions centered around critical challenges related to climate change, sustainability, energy security, equitable energy access and financing, in the context of global energy transitions. The meeting emphasized the urgent need for feasible, collaborative, and accountable policy actions to accelerate global energy transitions while ensuring universal energy access and just, affordable, and inclusive energy transitions in line with achieving Sustainable Development Goals (SDGs). The importance of developing and widely adopting both existing and emerging clean technologies was underscored, including Carbon Capture Utilization and Storage (CCUS), Green and Low Carbon hydrogen and its derivatives, biofuels, Small and Modular Reactors (SMRs), among others.

G20 Environment and Climate Ministers' Meeting

G20 Environment and Climate Ministers' Meeting, Chennai, India adopted a 68 paragraph Outcome Document and Chair's Summary. The entire text was unanimously agreed to by all G20 delegations, except for paragraphs 63-65 on mitigation/reductions of emissions (p63), clean energy transition (p64), the carbon border adjustment mechanism (p 65), and paragraph 66 on the geopolitical situation. Support was expressed for the theme of India's G20 Presidency, 'One Earth, One Family, One Future. The discussions were wide ranging and covered issues critical for planetary health. The document contained sections on accelerating climate action (p9-18), biosystem restoration (p 20-35), water resource management (p 36-40), conserving the ocean (p 41- 54), and pollution control and circular economy (p 55-62). Thanking the Indian Presidency for the efforts in developing the technical study, entitled "Accelerating the Transition to a Sustainable and Resilient Blue Economy", it adopted the 'Chennai High Level Principles for a Sustainable and Resilient Blue/Ocean-based Economy', as annexed, that may be implemented by the G20 members on a voluntary basis, based on national circumstances and priorities.

G20 Energy Transitions Ministers' Meeting

G20 Energy Ministers meeting in Goa, India, on 22 July 2023, agreed to paragraphs 1-20, paragraph 28-29, and Annex- I "G20 High Level Voluntary Principles on Hydrogen". Paragraphs 21-27 are the Chair's Summary issued under the responsibility of the Chair. covering energy transition pathways and the geopolitical situation (p27). The annexes were on Hydrogen, Critical Minerals, Energy Efficiency, Renewable Energy, and Finance for Energy Transitions. The meeting took note of the Indian Presidency reports on "Decentralized Renewable Energy for SDG7: Compendium of Global Good Practices" and "The Roadmap for Promoting Solar Energy for Universal Energy Access". The Presidency's "Voluntary Action Plan for Promoting Renewable Energy to Accelerate Universal Energy Access" (Annex D) to further renewable energy deployment globally, was also noted. There was a lack of agreement on phase down of unabated fossil fuels, and on abatement and removal technologies.

Science20 (S20) Summit successfully concluded

The Science20 (S20) Summit, a gathering of scientific academies from G20 members, successfully concluded on 22nd July 2023 at Coimbatore, India. The S20 Summit meeting featured sessions, dedicated to finalizing text of the Science20 Communiqué. The S20 affirmed

the role of strengthening international cooperation. It was agreed to establish a Mission Energy Access for inclusive clean energy transition. It was agreed to initiate a Global Digital Heritage Initiative, to preserve global heritage through the application of digital technologies. This initiative would broaden access to the rich heritage and culture from all G20 countries and other parts of the world. Establishment of an International Platform on Emerging Disruptive Technologies was also recommended, to generate and disseminate knowledge to help navigate the interfaces between science, technology, law, and policy. Under the theme of Universal and Holistic Health, it was agreed that there is an urgent need to focus on well-being and wellness. Dissemination of health information and strengthening microbial surveillance and prediction systems, monitoring wildlife, veterinary populations and human communities are all important to enable early detection and prediction of potential pathogens with pandemic potential.

IN BRIEF

Detecting the coronavirus in the air in minutes

Researchers at Washington University USA have created a machine a little bigger than a toaster that can detect airborne SARS-CoV-2 coronavirus in minutes. It takes only five minutes to detect as few as seven to 35 viral particles per liter of air. This detector pulls in 1,000 liters of air each minute. The sampler swirls liquid at high speed trapping viruses and concentrating them for analysis. Any viruses not captured in the liquid get filtered out of the air with a HEPA filter attached to the device. After five minutes of collection, the liquid is pumped to a biosensor. The biosensor consists of an electrode attached to a llama nanobody, a specialized immune system protein which attaches to any passing coronavirus by its spike protein. Electricity passing through the nanobody and spike protein causes tyrosine amino acids in the spike protein to oxidize, or lose electrons. Another device attached to the electrode detects that oxidation as a change in voltage, signaling that SARS-CoV-2 is in the air. In tests, the device detected even trace amounts of virus being shed by patients. The device could be used in hospitals, airports and other public areas to survey for the virus. The team is experimenting with nanobodies that can detect other respiratory viruses as well, such as influenza or respiratory syncytial virus.

Chemical transformation of chitosan

Researchers from China have developed a green, efficient and scalable preparation method for chitin hydrogels for its practical applications. The team was successful in fabricating a chemically stable and antifouling chitin hydrogel via a chemical reaction called acetylation. Through the acetylation process, the chitin hydrogel the team obtained possesses outstanding resistance to swelling, degradation, extreme temperature and pH conditions, and organic solvents. The team also learned that by templating the chitosan precursor with ice crystals, they could produce chitin hydrogels with different biomimetic structures. These structures can be either nacre-like or wood-like depending on the freezing method used with the chitosan precursor. The chitin hydrogel developed by the team has excellent mechanical properties while retaining a high water content. It also shows excellent antifouling performance, resisting the adhesion of proteins, bacteria, blood, and cells. The next step is to further improve the mechanical properties of chitin hydrogels and explore their biomedical applications such as cartilage replacement, bone replacement, wound dressing and even artificial organs.

Biodegradable film that keeps food fresh for longer

A research group in São Paulo have developed a film made of a compound derived from limonene, the main component of citrus fruit peel, and chitosan, a biopolymer derived from the chitin present in exoskeletons of crustaceans. They used a derivative of limonene called poly(limonene), and chitosan for the film matrix and used a compound with polar chemical functions to start the reaction and to increase interaction between the additive and the polymer matrix. The films with the poly(limonene) additive had better antioxidant activity, blocked ultraviolet radiation, and was non-volatile, making it suitable for large-scale production of packaging, where processing conditions are more severe. The team is working on further development of this technology.

High-Power Thermoelectric Device for Cooling

Scientists at Penn State have developed a thermoelectric cooler with significantly improved cooling power and efficiency compared to existing commercial units, making it a potential solution for managing heat in next-generation electronics. The device demonstrated a 210% increase in cooling power density and could maintain a similar coefficient of performance. The newly developed thermoelectric device demonstrated a 210% increase in cooling power density compared to the leading commercial device, constructed from bismuth telluride. Additionally, it potentially maintains a similar coefficient of performance (COP). This novel device is constructed from a compound of half-Heusler alloys, a class of materials with distinctive properties promising for energy applications like thermoelectric devices. These materials offer considerable strength, thermal stability, and efficiency. The researchers employed a special annealing process enabling them to alter and regulate the material's microstructure to remove defects.

Device makes hydrogen from sunlight with record efficiency

Rice University researchers have created a device that turns sunlight into hydrogen with record-breaking efficiency by integrating next-generation halide perovskite semiconductors with electrocatalysts in a single, durable, cost-effective and scalable device. The new technology is a significant step forward for clean energy and could serve as a platform for a wide range of chemical reactions that use solar-harvested electricity to convert feedstocks into fuels. The team built the integrated photoreactor using an anti corrosion barrier that insulates the halide perovskite semiconductor from water without impeding the transfer of electrons. The device achieved a 20.8% solar-to-hydrogen conversion efficiency. The researchers showed their barrier design worked for different reactions and with different semiconductors, making it applicable across many systems. With further improvements to stability and scale, this technology could open up the hydrogen economy.

RESOURCES & EVENTS

India and ASEAN meeting on Traditional Medicines

India and the Association of SouthEast Asian Nations (ASEAN) held a conference on traditional medicines at New Delhi. The Conference agreed to consolidate sustainable and resilient healthcare systems to achieve Sustainable Development Goals and Universal Health Coverage. A total of 75 delegates from India and ASEAN participated including two ASEAN countries participating through virtual mode. The Conference was divided into sessions with experts of Traditional Medicine from India and ASEAN sharing about the research they have done and other initiatives taken in protecting people from Covid. The second session dealt with

knowledge sharing on regulatory frameworks, quality control measures, and integration of traditional medicine into healthcare systems.

India-USA Strategic Clean Energy Partnership

A Ministerial meeting of the U.S.-India Strategic Clean Energy Partnership (SCEP), New Delhi recognised the importance of producing green/clean hydrogen as a critical energy source for global decarbonisation and agreed to support each other's national hydrogen missions.

The sides also welcomed the work done by the five pillars of the SCEP - 1) Power & Energy Efficiency, 2) Renewable Energy, 3) Responsible Oil & Gas, 4) Sustainable Growth, and 5) Emerging Fuels and Technologies. as well as in various fields such as emerging fuels and other advanced biofuels. Recognizing the role of carbon capture, utilisation and storage to reduce emissions, the sides agreed to spur partnership in this area by building on existing cooperation and welcoming new collaboration including exploring the geologic carbon storage potential. The sides welcomed the addition of Carbon Capture, Utilization and Storage as a work stream under the Emerging Fuels and Technology Pillar. They welcomed engagement through the Low-Emissions Gas Task Force. They launched the South Asia Group for Energy (SAGE) to deepen the engagement between Indian agencies and US national laboratories to support research, analysis and capacity building activities such as building modelling capacity in Life Cycle Assessment of low carbon technologies and analytics on energy consumption in the building sector.

Science Day: Evidence-based Strategies for SDG Acceleration

The first-ever Science Day was held during the annual session of the High-level Political Forum on Sustainable Development (HLPF). Approximately 120 scientists and academics, civil society representatives, and national government and intergovernmental decision-makers gathered to discuss scientific findings, methodologies, and tools that can help support evidence-based decision making for the SDGs. Many speakers highlighted that SDG implementation is too slow and lamented that science was not at the heart of the SDGs when they were created. Participants stressed the need to consider how science synthesizers, networks, and bridge builders can be engaged in the science-policy interface, and how trust in science can be rebuilt. Examples were given with respect to the ways in which the SDGs have provided a framework for understanding issues and pursuing transformation in a more holistic way. Several speakers discussed the need for “mission-driven science” or a “big science approach,” in which political objectives are matched with actions, institutions, capabilities, and resources to effectively achieve them. Based on the discussions, a call to action for HLPF 2023 and the September SDG Summit will be developed in the weeks following the event and shared with participants as well as on the official website of the SDG Summit as the position paper by the Scientific and Technological Community Major Group. The insights from the event will also inform the 2024 Summit of the Future. The creation of a Group of Friends on Science for Action by Belgium, India, and South Africa has also given momentum to the role of science in shaping decisions.

India and Papua New Guinea sign MoU on sharing INDIA STACK

Ministry of Electronics and Information Technology (MeitY) of India and the Ministry of Information and Communication Technology (MICT) of Papua New Guinea have signed a Memorandum of Understanding (MoU) to share INDIA STACK — a collection of open APIs

and digital public goods that aim to facilitate identity, data, and payment services on a large scale. The India stack is now available to any country interested in joining the digitalization trend that has accelerated in recent years. The discussions during the event covered essential aspects of digital transformation, such as Digital Public Infrastructure, Digital Identity, Digital Payment, Data Exchange, Data Governance, Data Protection Policies, internet, and mobile connectivity. The MoU is expected to enhance capacities and facilitate sharing and implementation of population-scale Digital Public Infrastructure and Transformational Platforms/projects to improve living standards and enhance efficiency and transparency in governance.

SCIENCE POLICY AND DIPLOMACY

Horizon 2047 India-France Strategic Partnership moves ahead.

India and France have agreed during the landmark visit of PM Narendra Modi, to adopt a roadmap Horizon 2047 to set the course for the bilateral relationship up to 2047. Cooperation is to be strengthened in sectors such as - (1) co-development and co-production of advanced defence technologies, including aircraft and submarines and warships (2) Triangular Development Cooperation (3) space technologies and applications (4) Scientific cooperation on common priority themes as decided from time to time, (space, digital, critical technologies, energy, ecological and urban transition, health, for example), (5) Critical technologies such as supercomputing, cloud computing, Artificial Intelligence and quantum technologies (6) Health and Medicine (7) Areas such as digital public infrastructure, cybersecurity, 5G/6G telecom and digital skills development. (8) climate change, protection of the environment, and disaster resilience (9) civil nuclear programme (10) decarbonated hydrogen production, renewable energies, energy efficiency. (11) One Health and pandemics, (12) Blue Economy and Ocean Governance (13) ending plastic pollution. (14) biodiversity protection (15) waste management (16) mobility of researchers and students.

Meeting on Plant Genetic Resources for Food and Agriculture:

The 10th meeting of the Ad Hoc Open-ended Working Group under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was held in Rome, 12-14 July 2023. It discussed changes in the international landscape since 2019, including recent decisions on access and benefit-sharing (ABS) from the use of digital sequence information/genetic sequence data (DSI/GSD) in other international fora, and what this means for potential avenues of work. These included - DSI/GSD; expansion of the list of crops in Annex I of the Treaty; and the payment structure and rates for benefit-sharing. The meeting revealed continued divergence between party positions on these issues, but agreed on a draft “June 2019 package” as a starting point. This package included a draft revised Standard Material Transfer Agreement (SMTA), amendment of Annex I, and a draft resolution with implementing provisions. The proposal on the advancement of negotiations will be put before the Treaty Governing Body meeting in November 2023. The Working Group is composed of up to 27 regional spokespersons, plus representatives of civil society, the seed industry, farmers’ organizations, and research and academia, including CGIAR.

Genetic Resources for Food and Agriculture discussed

The Commission on Genetic Resources for Food and Agriculture (CGRFA) of the Food and Agriculture Organization of the UN (FAO) held its nineteenth meeting in Rome, 15-21 July

2023. Earlier, the Convention on Biological Diversity (CBD) adopted the landmark Kunming-Montreal Global Biodiversity Framework (GBF). CGRFA discussed the implementation of the GBF alongside the Commission's Framework for Action on Biodiversity for Food and Agriculture (FA BFA). The Commission is also stepping up its work in a relatively new field—microorganism and invertebrate genetic resources (MIGR), including pollinator and biological control agents. The meeting set up an Intergovernmental Technical Working Group on MIGR and an Ad Hoc Expert Team on BFA. It endorsed the preparation of the third State of the World (SOW) report on Animal Genetic Resources, including a proposed outline and subsections. They also cleared the way for the second SOW on Forest Genetic Resources and the third SOW on Plant Genetic Resources to be finalized and published during the next two years.

Germany plans to restrict research cooperation with China

Germany's new China strategy has outlined plans to withhold federal support from research projects where there is a risk of "knowledge drain" to China, as well as promising to make German academics better aware of the security risks of cooperation. The strategy, released on 14 July, is a compromise document that aims to "de-risk" links to China without fully decoupling, aligning Germany with the approach set out by the European Commission earlier this year. The plan contains potentially significant new policy on research and innovation, and warns that scientific relations with Beijing have become unbalanced – again echoing Commission concerns. The most significant commitment is to issue provisions so that research projects with China in which knowledge drain is likely are not supported or only supported when suitable conditions are imposed. The China strategy also contains several references to China impeding access to civil society, the media, research institutions and governmental agencies to an ever greater extent, and censorship and administrative measures. The strategy also warns that China is turning even basic research to military ends under China's military-civil fusion policy.

International Seabed Authority (ISA) 28 th session

The ISA Council second part meeting took place from 10-21 July, and the annual session of the Assembly took place from 24-28 July, including representatives from 64 ISA members. The meetings were preceded by a meeting of the LTC from 28 June – 7 July and a meeting of the Finance Committee from 5-7 July. The divisions over deep-sea mining intensified after Nauru submitted to the ISA its intention to apply for approval of a plan of work for exploitation. The Council adopted decisions on: (1) the establishment of the position of an interim director general of the Enterprise; (2) the understanding and application of the two-year rule; and (3) the timeline following the expiration of the two-year period. The Council reiterated that commercial exploitation of mineral resources in the Area should not be carried out in the absence of rules and regulations relating to exploitation, but also expressed the intent to continue the elaboration of the rules and regulations, with a view to their adoption during the 30th session in 2025. A proposed agenda item on establishment of a general policy related to the conservation of the marine environment, including consideration of the effects of the two-year rule failed to get agreement and was deferred to the next years session. Key issues remain to be settled - whether there is enough knowledge to initiate commercial exploitation of deep-sea mineral resources while ensuring environmental protection, and whether the benefits to humankind are sufficient to proceed with these activities.

We welcome your comments and valuable suggestions. Please write to us for receiving publications, updates and notices regarding seminars, conferences etc. Contact us at science.diplomacy@ris.org.in

NOTE TO OUR READERS AND STAKEHOLDERS:

RIS Science Diplomacy Programme (fisd.in) is pleased to present this revised version of Science Diplomacy News Alerts, following India's assumption of the Presidency of the G20. A new section G20 and global challenges has been added. We request your cooperation to review the Alerts and improve its content. For this purpose, please complete the form at <https://forms.gle/o4d869FxaM9t3KNw7>, and submit it. Your support and cooperation is appreciated.