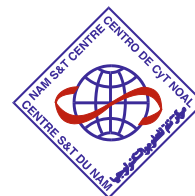


# NAM

## S&T Newsletter



A Quarterly of the  
Centre for Science and Technology of the Non-Aligned  
and Other Developing Countries (NAM S&T Centre)

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### FROM THE DG'S DESK

Warmest Greetings to all our Esteemed Readers!!



I am pleased to inform all our readers that in spite of various constraints, the NAM S&T Centre has been able to maintain a high level of performance with many successful initiatives undertaken on the promotion of "South-South Cooperation in Science and Technology", which has been possible due to the unstinted support of the Focal Points of the Centre in its Member Countries and other stakeholders in various countries.

During the last quarter of 2023, the NAM S&T Centre has successfully organized an International Conference on 'Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues (IEEHDS - 2023)' in partnership with the JSS Academy of Higher Education and Research (JSS AHER), Mauritius during 21-23 November 2023 in Mauritius. The Conference held in Hybrid-mode was attended by over 85 participants from 9 countries and aimed to address various challenging issues to strengthen primary and other healthcare systems, striving towards *Universal Health Coverage*.

Recognizing the significance of socio-economic relevance, the NAM S&T Centre has published a Fact File on "Rare Diseases: An Emerging Global Health Priority". This marks the third event in a series of Fact Files aimed at disseminating information on topics of global concern especially that are relevant to the Global South. The Centre remains committed to producing similar "Fact Files", in future as well, on various S&T subjects that are of interest to the society at large, particularly in the developing world.

After the difficulties faced during the COVID-19 Pandemic, the NAM S&T Centre is now fully geared up for execution of its scientific activities and a number of scientific events on various exciting topics are now lined up to be organized in the near future, mostly in Physical Mode.

The Centre in collaboration with the Indian Ocean Rim Association (IORA) Secretariat, Mauritius and the Scientific Committee on Problems of the Environment (SCOPE), Amstelveen, the Netherlands announces the organization of a two-day International Workshop on "Impacts of Climate Change on Small Island Developing States (SIDS)" during 28-29 February 2024 in Virtual-mode. Interested scientists may look for the detailed guidelines for submission of applications for the Workshop available at the Centre's website: [www.namstc.org](http://www.namstc.org).

The Centre invites applications from suitable candidates from its Member Countries and Members of the NAM S&T-Industry Network for the "Joint NAM S&T Centre – ICCBS Fellowship Programme in Natural Products Chemistry, Drugs and Pharmaceuticals" for the year 2024. The guidelines for the fellowship and other details are available at the Centre's website: [www.namstc.org](http://www.namstc.org).

In pursuance of its objective on dissemination of information and knowledge, the NAM S&T Centre has expanded its scope of scientific publications, with efforts dedicated to bringing out a variety of books and monographs covering different S&T subjects. A list of the Centre's publications is available on its website. It is noteworthy that all our recently released books/monographs have been published by the globally renowned research and academic publisher, Springer Nature, Singapore and a few more books are currently at the production stage with Springer.

We are looking forward to further support and cooperation from our Member Countries and other stakeholders.

Happy Reading!!

*Amitava Bandopadhyay*  
**(Amitava Bandopadhyay)**  
Director General

### Centre Organised

International Conference on  
**Improving Efficiency and Effectiveness in Health Delivery Systems in  
Developing Countries: Research, Implementation and Policy Issues (IEEHDS-2023)**  
Mauritius, 21-23 November 2023

Ensuring healthy lives and promoting well-being at all ages is essential for sustainable development. A significant portion of the global population still lacks access to vital healthcare services. To bridge this gap and ensure efficient and effective healthcare provisions, addressing disparities in the system is critical. Various determinants of health, including environmental and other commercial factors need attention to pave the way for achieving the common objective of "Health for All" and related sustainable development goal targets.

In view of the above, the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi in partnership with the JSS Academy of Higher Education and Research (JSSAHER), Mauritius organized an International Conference on "Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues (IEEHDS - 2023)" during 21-23 November 2023 at Pearle Beach Resort, Flic en Flac, Mauritius. The Conference was hosted by JSSAHER, Mauritius in association with the NAM S&T Centre and sponsored by JSSAHER, Mysuru, M/s Unicorn MSJ Ltd. and M/s Biswal Trading Ltd.

The objective of the Conference was to address various challenging issues to strengthen the primary and other healthcare systems with a view to achieve universal health coverage, including financial risk protection; access to safe, affordable and effective vaccines and medicines; fight antimicrobial resistance; fight communicable and non-communicable diseases; reduce mortality rate; disease prevention and management; increased investment in health research & development and increased health financing.



**Inauguration of International Conference on "Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues"**

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The “IEEHDS-2023” Conference was attended by over 85 participants from 9 countries, including Egypt, India, Indonesia, Malaysia, Palestine, South Africa, Zambia, Zimbabwe and the host country Mauritius and was organized in Hybrid-mode.

The Overall Conference was divided into - an **Opening Session**, **7 Technical Sessions**, a **Panel Discussion** and a **Closing Session** including adoption of a Resolution by the participants. Under various technical sessions **5 Keynote Lectures** were delivered and **25 Technical Papers** were presented.

The seven technical sessions were: 'Disease Prevention, Management and Control', 'Natural Products (NPs) for Health Promotion', 'Healthcare Delivery - Science, Technology and Innovation', 'Medicines, Vaccines and Health System - Research & Development', 'Communicable and Infectious Diseases, Mental Health and Well -Being, and Health Financing and Workforce', 'Improving Health Delivery Systems through Quality Care' and 'Anti Microbial Resistance (AMR)'.

The Inaugural Session started with Welcome Remarks by Prof. Dr. Ashish D. Wadhvani, Head, Faculty of Health Sciences & Dean, School of Pharmacy, JSS AHER, Mauritius. Prof. Dr. Wadhvani, in his address, warmly welcomed the invited speakers, the Guest of Honour, Chief Guest, participants from various NAM Member and other developing countries, students and colleagues from JSSAHER, Mauritius and JSSAHER, Mysuru, online-invited participants and explained about the background and objectives of “IEEHDS-2023” Conference and also various topics to be covered.

Following this, Prof. Dr. Praveen Mohadeb, CEO and Vice-Chancellor, JSS AHER, Mauritius gave a brief about JSSAHER, Mauritius and mentioned that many developing nations are facing significant challenges in providing effective healthcare services to their respective populations. To provide a quality healthcare system that is effective, efficient, economical and efficacious, a multi-dimensional approach is needed to advancing global well-being through collaborative efforts, innovative solutions and exchange of knowledge.

The Opening Remarks were given by Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre, who in his address, welcomed distinguished participants from various NAM Member and other developing countries, Guest of Honour, Chief Guest and other invited officials from the Ministry of Education, Tertiary Education, Science and Technology, Mauritius. He mentioned that Mauritius is currently holding the Office of the President of the Governing Council of the NAM S&T Centre and for the past several years held the office of one of its Vice Presidents. He further outlined the role of NAM S&T Centre in promoting South-South Cooperation in Science, Technology and Innovation for collective self reliance of developing countries and helping its Member Countries in achieving *UN Sustainable Development Goals-2030*.

The Guest of Honour – Mr. Youdhisteer Munbodh, President, NAM S&T Centre Governing Council and Permanent Secretary, Ministry of Education, Tertiary Education, Science and Technology, Mauritius in his address mentioned that the Conference on such an important theme was being organized at the right time when Mauritius is already on the way to make the health and medical sector a pillar of its economy including medical tourism. He acknowledged the unwavering contributions of the NAM S&T Centre in advancing Science and Technology - as a fundamental enabler for the socio-economic growth and prosperity amongst its Member Countries. Underlining the role of Science, Technology and Innovation (STI) in Green Revolution, Chandrayaan Mission, Nobel Science Discoveries etc, he mentioned that it is high time for countries in the global south to harness the potential of STI in catalyzing their socio-economic development. Further he added that, though health is a fundamental human right; many developing countries face significant challenges in ensuring accessible, affordable and quality healthcare to their people and this Conference is a medium to discuss how the intersection of science, technology and visionary policies can pave the way for transformative changes in our health delivery systems.

The Chief Guest – Dr. Bhooshun Ori, Director General of Health Services, Ministry of Health and Wellness, Mauritius in his address, mentioned that the JSSAHER, Mauritius and the NAM S&T Centre have an excellent track record in promoting S&T and Education and by convening this Conference; they have emphasized the interdependence of research, implementation and policy. The synergy created is a testament to their commitment for a meaningful change. The use of artificial intelligence and big data analytics can enhance diagnostic accuracy and streamline healthcare management. In addition, innovations in pharmaceuticals and medical devices hold the promise of more efficient treatments and interventions. He concluded that healthcare is a universal right and the Conference has provided a chance to recognize the importance of research, implementation and policymaking to create lasting improvements in health delivery systems in developing countries.

A Vote of Thanks was given by Mr. Naveen KP, Registrar, JSS Academy of Higher Education and Research, Mauritius.

During the Technical Sessions five Keynote Speakers were: Mr. Sadeck Vawda, Unicorn (MSJ Ltd.) [Mauritius], Prof. Ntobeko A.B. Ntusi, Groote Schuur Hospital and University of Cape Town [South Africa], Prof. Namrita Lall, University of Pretoria [South Africa], Dr. H. Basavana Gowdappa, JSS Medical College, JSS Academy of Higher Education & Research, Mysuru [India] and Dr. Thenkrishnan Kumaraguru, CSIR-Indian Institute of Chemical Technology, Hyderabad [India]. The respective lectures delivered by them were on “Recent Advances in Therapeutics”, “Aetiology, Epidemiology, Natural History, Outcomes and Management of Heart Failure in Sub-Saharan Africa”, “Regulatory Aspects for a Natural Based Innovation”, “Health Delivery Systems in an Emerging Economy and Role of Innovation for Cost Effective Delivery: A Case Study from India” and “Role of Generic Drugs on Effective Health Delivery Systems and Health Sector”.

Ten paper presentations from Mauritius were made by Prof. Dr. V. Jaishree, JSS Academy of Higher Education and Research; Dr. Goutham Yerrakula, JSS Academy of Higher Education and Research; Dr. Mrs. Amitabye Luximon-Ramma, University of Technology, Mauritius (UTM); Dr. Khayati Moudgil, JSS Academy of Higher Education and Research; Mr. Mohaboob

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Mohummud Ayoob Feerhaan, Sir Seewoosagur Ramgoolam National (SSRN) Hospital; Ms. Ramasawmy Mary Eileen, JSS Academy of Higher Education and Research; Ms. Zeenaat Bhatoo and Ms. Neelakshi Joyram, JSS Academy of Higher Education and Research; Ms. Madina Zina Elaheebucus, JSS Academy of Higher Education and Research; Mr. Jean Maxwell Andre, Queen Elizabeth Hospital, Rodrigues Island and Dr. Mohadeb Somar Varsha, Dental Council of Mauritius. Their respective papers were on “Role of Free Radicals and Certain Antioxidants in the Management of Various Diseases: An Overview”, “Assessment of Single Nucleotide Polymorphism and Genetic Frequency of Human Carboxylesterase 1 in South Indian Population”, “The Ayurvedic Health Services in Mauritius: A Case Study on Patient's Perception”, “The Versatility of Clinical Pharmacist: Shifts from Dispensing to Bedside Care”, “A Cross-Sectional Study to Assess the Prevalence, Types, and Contributing Factors of Violence against Healthcare Workers at SSRN Hospital, Mauritius” (online-mode), “Ensuring Safety of Novel Oral Anticoagulants Predictable Dose-Response Relationship”, “Evaluation of the Inhibitory Effect of Anticancer Drugs 5-Fluorouracil and Gemcitabine on HSV Infections - A Drug Repurposing Approach”, “Evaluation of Anti-Angiogenic Potential of Docetaxel and Meloxicam”, “A Study to Assess Out-Patient Satisfaction with Healthcare Delivery at a General Hospital in Rodrigues Island, Republic of Mauritius” (online-mode) and “Patient's Satisfaction in Dental Public Healthcare Centres in Mauritius”.

An Address was delivered by Mr. Siddique Khodabocus, Chairman of Pharmacy Council of Mauritius.

There were fourteen paper presentations made by the foreign participants. From India, five presentations were made in online-mode by: Ms. Magham Sai Varshini, JSS Academy of Higher Education and Research, Ooty; Ms. Prathna N. Sahetya, JSS Academy of Higher Education and Research, Mysuru; Ms. Neeta Mystica Jarain and Mr. Anandhu Subhash, JSS Academy of Higher Education & Research, Mysuru; Mr. Magesh R., JSS Academy of Higher Education and Research, Mysuru and Ms. Rihana Begum Patnool, JSS Academy of Higher Education & Research, Ooty. Their respective papers were on “Evaluation of Neuroprotective Activity of CB2 Agonists: An In-Silico, In Vitro and In Vivo Approach”, “Radiographers' Perception of Patient Safety Culture”, “A Review of Frugal Innovations in Indian Healthcare System: A Model for Sustainable Healthcare Practices”, “Good Health and Well-Being: A Review of Health Care Provisions for Sex Workers in India” and “Bacterial Profiling and Antibiotic Resistance in Pus Clinical Isolates from a Tertiary Care Hospital”.

From Malaysia, two papers were presented by Mrs. Munira Binti Muhammad, Ministry of Health in online- mode and Dr. Rima Marhayu Abdul Rashid on “Pharmacy Integrated Community Care (PICC)” and “Implementation of Wound Care Services at Primary Healthcare (PHC) Facilities 2019-2022: Step-down Care to Improve the Efficiency of Health Care System” respectively.

Two paper presentations from Zimbabwe were made by Prof. Kudakwashe Chitindingu, Chinhoyi University of Technology and Prof. Dr. Collett John Mawire, Ministry of Health and Child Care, Chinhoyi Provincial Hospital presented paper presentations on “National Health Research Agenda Setting for Improving Healthcare Delivery: Case of Zimbabwe” and “5s-Kaizen for Improvement of Health Delivery Quality in Developing Countries” respectively.

Mr. Aris Yulianto, National Research and Innovation Agency (BRIN) from Indonesia presented a paper titled “Enhancing Disease Management in Indonesian Puskesmas: A Technological Approach to Record and Report Apps”. Dr. P. Naidoo, University of KwaZulu-Natal, Durban from South Africa presented a paper titled “Reporting Adverse Effects and Events Experienced by Health Care Professionals Receiving the Johnson & Johnson COVID-19 Vaccine in the Ethekwin Metropolitan of Kwazulu-Natal, South Africa: A Descriptive Cross-Sectional Quantitative Study” in online-mode.

From Zambia, a paper titled “The Role of Indigenous Herbal Formulations in Building Pandemic-Ready Health Systems: A Systematic Review” was presented jointly by Mr. Muunda Mudenda and Ms. Getrude Pemba, National Institute for Scientific and Industrial Research, Lusaka.

Dr. Fathi Abumoghli, Former Minister of Health from Palestine through an online interaction provided an overview of the health delivery system in Palestine and challenges being faced by the health authorities in present difficult scenario.

Prof. Ghada Yousef Elkamah, National Research Centre, Cairo from Egypt presented a paper on “Implementing Precision Medicine for Improved Health Services”.

During the Conference, a Fact File on “Rare Diseases: An Emerging Global Health Priority” published by the NAM S&T Centre, New Delhi jointly with the JSS Academy of Higher Education and Research, Mysuru, India was officially released.

In between the technical presentations, a Panel Discussion on “Strengthening Health Care Delivery Systems in Developing Countries: A Global Imperative for Achieving Universal Health Coverage” was held amongst the panel members and the participants. The Panel comprised of the following



**Group Photo of International Conference on ‘Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues’**

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seven Members: Dr. H. Basavana Gowdappa [India]; Dr. T. Kumaraguru [India]; Prof. Praveen Mohadeb [Mauritius]; Prof. V. Jaishree [Mauritius]; Prof. Ntobeko Ntusi [South Africa] and Prof. Namrita Lall [South Africa] and was moderated by Prof. Dr. Ashish D. Wadhvani [Mauritius]. During the panel discussion, extensive deliberations were held and ideas were exchanged to improve efficiency and effectiveness of healthcare delivery systems in developing countries.

During the Concluding Session a Resolution on “**Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues (IEEHDS-2023)**” was deliberated and adopted unanimously with a set of recommendations to various countries.

Closing Remarks were made by Prof. Dr. Praveen Mohadeb, JSSAHER, Mauritius and Dr. Amitava Bandopadhyay, NAM S&T Centre, New Delhi. Concluding Remarks were given by Prof. Dr. Ashish D. Wadhvani, JSSAHER, Mauritius.

## Resolution



### IMPROVING EFFICIENCY AND EFFECTIVENESS IN HEALTH DELIVERY SYSTEMS IN DEVELOPING COUNTRIES: RESEARCH, IMPLEMENTATION AND POLICY ISSUES (IEEHDS 2023)



**WE, THE DELEGATES**, participating in the International Conference on “**Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues**” (IEEHDS 2023) organized by the JSS Academy of Higher Education and Research, Mauritius (JSSAHERM) and the Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre), New Delhi, from November 21-23, 2023, Mauritius;

Representing the governments, academic and research institutions, and S&T agencies from Egypt, India, Indonesia, Malaysia, Mauritius, Palestine, South Africa, Zambia, and Zimbabwe; as well as other relevant stakeholders;

**RECOGNIZING** that promoting health and well-being is one of the 17 Global Goals that make up the 2030 Agenda for Sustainable Development.

**REALIZING** that an integrated approach is crucial for progress across multiple health goals and promoting well-being for all at all ages is an important task and to achieve healthy living, the best practices of different countries must be discussed and the policies should be recommended to the respective Governments.

**RECALLING** the aims of the conference: (a) *Achieve universal health coverage*, including financial risk protection, access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all (b) *Support translational research*, development and universal access to affordable vaccines and medicines (c) *Frame strategies to reduce mortality* from non-communicable diseases and promote mental health (d) *Fight communicable diseases* with more emphasis on preventive components reachable to all (e) *Increase health financing* and *support the health workforce* in developing countries (f) *Substantially reduce the number of deaths and illnesses* from hazardous chemicals and air, water and soil pollution and contamination (g) *Understand the role of natural products* in health care system (h) Overall strategies to move towards health and wellness from curative focused strategies.

**COMMITTING** ourselves to achieve the laudable development goals set forth by the global community by the United Nations Sustainable Development Goals proposed during the Summit held in September 2015, which calls for urgent action by all countries - developed and developing - in a global partnership to achieve SDG 3 – “Good Health and Well-Being” and “One Health” by World Health Organisation (WHO).

**UNANIMOUSLY RESOLVE AND RECOMMEND THE FOLLOWING:**

- 1. Encourage Collaborative Interdisciplinary Research:** *Facilitate partnerships* among scientists, academicians, researchers, industry partners, students and regulators, across various disciplines to conduct comprehensive research addressing the diverse healthcare needs and challenges of developing countries.

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2. **Establish a Global Research Consortium:** Foster the creation of an international consortium for developing countries dedicated to *health systems research, pooling resources* and *expertise to generate evidence-based solutions* for improving healthcare delivery.
3. **Support Capacity-building Initiatives:** Promote initiatives that *strengthen research capabilities* in developing countries, including industrial training programs, mentorship, and access to resources to empower local researchers.
4. **Promote Technology Adoption:** Advocate for the integration of innovative technologies in health delivery systems, with a *focus on telemedicine, digital health records*, use of *artificial intelligence* and data analytics to enhance efficiency and accessibility.
5. **Promote Medical and Paramedical Education and Training in Developing Countries:** Use of existing *infrastructure and capabilities* will lead to savings in resources and a reduction in duplication of research, education and training infrastructure facilities.
6. **Develop Community-Centric Healthcare Models:** Encourage the implementation of healthcare models that prioritize *community engagement*, ensuring that interventions are culturally sensitive and responsive to the unique needs of local populations, prioritizing the more prevalent health problems of the region.
7. **Use of Generic Drugs to Improve Health Delivery Systems:** *Promote extensive use of generic drugs* for cost reduction and improve the effectiveness of health delivery system in the Global South. Make the essential drugs to be available, accessible and affordable even at rural and tribal areas.
8. **Natural Products and Traditional Knowledge:** To promote *natural product-based drug development and delivery, adapting traditional knowledge* for the enhancement of the therapeutic effect. These products may increase the pharmacological effects in addition to conventional medicines and be incorporated into prescription drug therapies.
9. **Strengthen Primary Healthcare Infrastructure:** Invest in the development and maintenance of *robust primary healthcare infrastructure*, including clinics and community health centers, to improve accessibility to comprehensive preventive care to promote wellness.
10. **Establish and Strengthen Health Workforce Development Programs:** Support policies that *enhance the training and development of healthcare professionals* of all categories, with an emphasis on addressing shortages, improving skill sets, and fostering a supportive working environment.
11. **Establish a Platform for Sharing of Best Practices:** A secretariat to study, examine and *advocate best practices in health delivery systems* in developing countries, success stories and models from various countries may be deployed and adapted.
12. **Climate Change on Health and Environment:** Identifying and addressing the *economic impact of climate change on health and environment* in developing countries and framing the policies and procedures for sustainable health delivery systems.
13. **Precision Medicine:** Identifying and prioritizing the need for *implementation of Precision Medicine in healthcare practices*. Pharmacogenomics related research application needs to be promoted with ethical considerations.
14. **Advocate for Evidence-based Formulation of Policy:** Urge governments and international organizations to base healthcare policies on sound research evidence and cost-effectiveness ensuring that strategies are tailored to the specific challenges faced by individual developing countries.

This resolution does not represent the views or positions of the JSSAHERM or NAM S&T Centre Member States, but a set of technical recommendations from the conference participants to JSSAHERM and NAM S&T Centre Member States for their consideration.

These recommendations are also non-binding and may be taken up at their discretion.

**THUS, RESOLVED AND ADOPTED UNANIMOUSLY ON THE 23<sup>rd</sup> NOVEMBER 2023 at MAURITIUS.**

## Joint NAM S&T Centre – ZMT Bremen (Germany) Fellowship Programme 2023

### Research Completion Reports



**Dr. Amy Then Yee Hui**, Senior Lecturer at Institute of Biological Sciences, Faculty of Science, Universiti Malaya, Kuala Lumpur, Malaysia was sponsored by the NAM S&T Centre under its Joint NAM S&T Centre – ZMT Bremen (Germany) Fellowship Programme for the year 2023 to carry out her research on “**Clarifying the Population Structure of the Endangered Bottlenose Wedgefish in Malaysia**” under the guidance of **Prof. Oscar Puebla**, Head of the Fish Ecology and Evolution Working Group, ZMT, Bremen; Professor of Fish Ecology (University of Oldenburg) from **September–December 2023**.

The aim and objective of the research work was to advance the broad conservation of endangered shark and ray species in Malaysia by focusing specifically on bottlenose wedgefish species *R. australiae* and other similar looking species.

The sampling work of tissue samples of wedgefishes from across Malaysia were funded by two conservation grants, Save Our Seas Foundation and World Wide Fund – Malaysia and were conducted at various landing sites and markets across Malaysia from September 2015 to February 2023. Encountered Rhynchobatus specimens were field identified to species level. Photographs of dorsal view (whole specimen and snout to trunk) were taken for reference and fin clips were collected and preserved in absolute ethanol for subsequent molecular analysis. In addition, external morphological characteristics visible from photographs of the animal's dorsal surface were examined and counted. For molecular confirmation of species identity and visualization of phylogenetic relationships of wedgefishes, a maximum of ten samples per species were selected to represent multiple locations across Malaysia. DNA of these samples was extracted using the PrimeWay Genomic DNA extraction kit (Malaysia). Two mitochondrial DNA (mtDNA) markers, cytochrome oxidase subunit 1 COI and NADH dehydrogenase subunit 2 ND2, using newly designed primers. The PCR amplification was performed and all PCR products were examined using 1% agarose in TAE buffer prior to Sanger sequencing service at a private company in Malaysia. For the population genetics study on *R. australiae*, the control region (CR) and ND2 were amplified using newly designed primer sets. Similar PCR protocol procedure was followed as described earlier.

A total of 85 tissue samples of Rhynchobatus were collected from across Malaysia for subsequent phylogenetic and population genetics analyses. Field identification coupled with molecular verification revealed that *R. australiae* made up 87% of the sample composition, followed by *R. palpebratus* (11%) and a single *R. springeri* individual. Phylogenetic tree constructed using combined mitochondrial DNA markers (COI and ND2), showed support for five monophyletic Rhynchobatus species lineages. This is in contrast to paraphyletic trees constructed using individual markers, especially for COI marker. The species tree estimated using the ASTRAL analysis for the combined COI and ND2 markers was topologically congruent with their respective gene trees. Low genetic diversity and some fine scale genetic structuring was seen for *R. australiae* that was broadly distributed across coastal Malaysia. The other two congeners appeared to show restricted spatial distribution with limited spatial overlap except in southwest Sarawak, Malaysian Borneo.

The nationwide fisheries-based assessments using a combination of morphological and molecular approaches, confirm the occurrence of three Rhynchobatus species in Malaysia. The discovery of *R. palpebratus* represents a new species record of ray in Malaysia, highlighting the importance of the country's waters, particularly the waters of Sarawak that host seven out of the eight known rhino ray species in the country. The new species record of *R. palpebratus* indicates a likely wider distributional range for the species in the Indo-west Pacific region, which was previously thought to be mainly distributed in Australia. Species-specific distribution information indicates limited overlap and a fragmented range for both *R. palpebratus* and *R. springeri* that are likely habitat specialists. This study also highlights the limitations of using the standard COI barcoding marker to resolve taxonomic status for the Rhynchobatus species complex. Future genetic analysis for the wedgefish taxon can be done using the ND2 marker to potentially discriminate species accurately between members within the Rhynchobatus species complex.

To create visibility of the results from this research as well as other ongoing shark and ray works, Dr. Hui presented a 40-min hybrid talk in ZMT on 'Coastal waters of southwestern Malaysian Borneo as Important Shark and Ray Area – insights from integrated data poor approaches and way forward' on November 20, 2023 and gave a 20-min hybrid talk on 'Integrated approaches for assessment of shark and ray fisheries – the Malaysian case study' in Thunen Institute of Fisheries, Bremerhaven, on November 29, 2023. She was also invited to present a talk on her fisheries and mangrove work in Humboldt University of Berlin on October 16, 2023.



**Mr. Edwin Jefri**, Lecturer at the University of Mataram, Nusa Tenggara Barat, Indonesia was sponsored by the NAM S&T Centre under its Joint NAM S&T Centre – ZMT Bremen (Germany) Fellowship Programme for the year 2023 to carry out his research on “**Histology and Biomarker of Pollutant Impacts from Shrimp Pond Aquaculture Effluents with *Monetaria annulus* as an Indicator Species**” under the guidance of **Prof. Dr. Marie Fujitani**, Work Group Leader, Deliberation, Valuation and Sustainability from **July–October 2023**.

This study investigates the histological alterations and biomarker responses of aquatic organisms exposed to shrimp pond effluents, focusing specifically on Lombok Island, Indonesia- an area known for its rich biodiversity and growing aquaculture activities. Lombok Island's coastal regions bear witness to the dynamic interplay between aquaculture practices and the marine environment. Against this backdrop, this research study explores the histopathological changes in aquatic organisms impacted by shrimp pond effluents, aiming to unravel the intricate relationship between pollutant exposure and biological responses. *Monetaria annulus*, a gastropod species known for its sensitivity to environmental variations, assumes a pivotal role as the indicator species in this study, providing valuable insights into the sub-lethal effects of pollutants.

The sample collection and snail fixation process in Lombok was carried out in June 2023. The histology process, involving embedding, sectioning, staining and microscopy was carried out in the BioLab, ZMT laboratory. Thirty samples of *M. annulus* were taken per site (4 sites). Shells were cracked, and the organs were laid out and cut into pieces at maximum size of 5 mm x 5 mm

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x 5 mm. The pieces were then placed into test tubes and filled up with Bakers Formol (2ml). Samples were stored in the fridge at 4-6°C for 24 h. Bakers Formol was then replaced with Gums Sucrose. Tissues underwent a series of processes to dehydrate and infiltrate them with a medium that can be easily embedded in paraffin wax. Dehydration removes water from the tissue, and clearing agents help make the tissue transparent. The tissue is then infiltrated with molten paraffin wax, which hardens into blocks and provides support for thin sectioning. The blocks are then sectioned into thin slices (usually around 4-5 micro meters thick) and are mounted on glass slides and then stained with Lipofuscin (LIP) and Periodic Acid Schiff (PAS). Cellular details, tissue architecture, and abnormalities in the tissues were observed and analyzed under a light microscope. From the microscopy process, 2400 images were obtained of various magnifications for diagnosis.

Images were then interpreted to identify abnormalities such as inflammation, infection, tumors, or other structural changes. This study recommends the implementation of a systematic and consistent sampling frequency to track changes over time, considering both seasonal and event-driven variations. It also suggests employing a suite of biomarkers (oxidative stress markers, enzyme activities, genotoxicity assays, etc.) to assess the physiological responses of *M. annulus* to pollutant exposure. Additionally, the study recommends analyzing water and sediment samples for key pollutants associated with shrimp pond aquaculture, such as heavy metals, pesticides, nutrients, and organic matter.

## FACT FILE

### RARE DISEASES: AN EMERGING GLOBAL HEALTH PRIORITY

**A Fact File on RARE DISEASES**  
An Emerging Global Health Priority

Document No. SF/19/03/2023

**FROM THE DG'S DESK**

**Rare Diseases: An Emerging Global Health Priority**

A Rare Disease affects only a smaller percentage of the population, compared to other general diseases. Its prevalence is comparatively very low. As rare disease occurs infrequently in a population, there is no universal definition. The World Health Organization (WHO) defines a rare disease as an often debilitating lifelong disease or disorder condition with a prevalence of 1 or less, per 1000 population. It is estimated that there are about 7000 rare diseases. Most of the rare diseases – (about 80%) are genetic and hence affects a large number of children. However, some rare diseases, including certain cancers, autoimmune disorders, and infectious tropical diseases, are not inherited. Unfortunately, there are no treatments available for many rare diseases. Identification and treatment of rare diseases are challenging tasks because of the general lack of awareness and very limited availability of scientific and medical infrastructure. By and large, the rare diseases include inherited cancers, autoimmune disorders, congenital malformations, neurodegenerative disorders, rare infectious diseases, haemangiomas, Hirschsprung disease, Gaucher disease, Cystic fibrosis, Muscular dystrophies, and Lysosomal Storage disorders (Inborn errors of metabolism).

**Introduction**

Rare Diseases (RDs) affect a relatively small proportion of the world's population; although, historically, these diseases are uncommon, collectively, they affect a large significant number. Every country has its own definition and/or criteria for rare diseases. There is no single widely used definition of a rare disease. In the definitions and challenges, this data collection examines the definitions of RDs in various countries and states. It is estimated that 80% of RDs are genetic in origin. There is a lack of data, evidence and knowledge about RDs due to the inherent heterogeneity, complexity and/or paucity of numbers.

**Global Scenario of RDs**

Globally, rare diseases are emerging as important public health concerns. According to the World Health Organization (WHO), more than 6,000 conditions are defined as rare diseases in the U.S. per 10,000 population. While there is no universal definition of RD, some countries have been diagnosed with particular diseases, while others include the availability of adequate treatments, or the severity of the disease, and vital infections, allergies, and even degenerative diseases of the brain.

**Table 1 and 2 depicts the definition of RDs in some of the NAM and non-NAM countries.**

COUNTRY	DEFINED NUMBER OF PATIENTS	PATIENTS PER 100,000
<b>Africa: Out of 53 NAM countries in this region only South Africa has defined rare diseases</b>		
South Africa	-	25 per 10000 population
<b>Asia: Out of 29 Asian countries in NAM, none has defined rare diseases</b>		
<b>Latin America and Caribbean: Out of 24 countries in this region five countries have defined the rare diseases</b>		
Bolivia	-	Less than 10 per 100000 population
Mexico (Observer country)	-	Less than 10 per 100000 population
Costa Rica	-	Less than 10 per 100000 population
Colombia	-	Less than 10 per 100000 population
Peru	-	Less than 10 per 100,000
<b>Europe: Out of five European countries in NAM, both have no definition of rare diseases</b>		

A Rare Disease (RD) affects only a smaller percentage of the population, compared to other general diseases. Its prevalence is comparatively very low. As rare disease occurs infrequently in a population, there is no universal definition. The World Health Organization (WHO) defines a rare disease as an often debilitating lifelong disease or disorder condition with a prevalence of 1 or less, per 1000 population. It is estimated that there are about 7000 rare diseases. Most of the rare diseases – (about 80%) are genetic and hence affects a large number of children. However, some rare diseases, including certain cancers, autoimmune disorders, and infectious tropical diseases, are not inherited. Unfortunately, there are no treatments available for many rare diseases. Identification and treatment of rare diseases are challenging tasks because of the general lack of awareness and very limited availability of scientific and medical infrastructure. By and large, the rare diseases include inherited cancers, autoimmune disorders, congenital malformations, neurodegenerative disorders, rare infectious diseases, haemangiomas, Hirschsprung disease, Gaucher disease, Cystic fibrosis, Muscular dystrophies, and Lysosomal Storage disorders (Inborn errors of metabolism).

The multidimensional impact of rare diseases extends beyond individuals to affect families and communities. Additionally, there is a lack of awareness among general public and health professionals on the burden, manifestations, diagnosis, treatment and consequences of rare diseases. Rare diseases have also sought considerably negligible attention from health systems and policymakers. RDs impose a considerable economic burden on the families and communities encompassing direct costs related to hospital care, diagnosis, and medications, as well as indirect costs linked to sickness absenteeism and early retirement.

Considering the importance of socio-economic relevance of the subject, the NAM S&T Centre has published its third Fact File on “Rare Diseases: An Emerging Global Health Priority”. The Fact File has been jointly prepared by the JSS Medical College, JSS Academy of Higher Education & Research, Mysuru in collaboration with the NAM S&T Centre. The publication has been conceptualized and edited by Dr. Deepa Bhat, JSS Academy of Higher Education & Research, Mysuru. The document provides a comprehensive overview about rare diseases: types of RDs, causes and their impacts; status of RDs in various developing countries; challenges in RDs; relevance of genetic counselling in RDs and, prevention and control of RDs. The document briefly highlights that **rare diseases** are emerging as major global public health concerns and the disabilities arising from these diseases, coupled with diagnostic and treatment uncertainties, exert a detrimental influence on the health, psychosocial well-being, and economic stability of affected individuals and their families. There is a need to adapt focused measures in raising the public awareness, empowering the health care providers on diagnosis, management, and prevention of rare diseases. Cost effective screening and diagnostic facilities need to be established to facilitate early detection and management of these conditions. The international stakeholders, including those from the Non-Aligned Movement (NAM) and the World Health Organization (WHO), need to collaborate with national-level policymakers to develop country-specific strategies for reducing the burden of rare diseases. Innovative and collaborative approaches are essential to improve the care, management, and treatment of these often devastating conditions, ensuring a brighter and healthier future for individuals and communities affected by rare diseases.

## Special Feature

### 28<sup>TH</sup> CONFERENCE OF THE PARTIES - AGREEMENT SIGNALS “BEGINNING OF THE END” OF THE FOSSIL FUEL ERA

The 28<sup>th</sup> Conference of the Parties (COP28) held during 30<sup>th</sup> November -12<sup>th</sup> December 2023 in Dubai, United Arab Emirates, brought together world leaders, negotiators, observer organizations and stakeholders around the world to discuss and agree on ways to address the climate crisis. Marking a historic milestone, COP 28 concluded with an ambitious plan to shift from fossil fuels to renewable and mobilise \$85 billion for climate action.

**Event participation and inclusivity:** World leaders at COP28 were joined by civil society, business, indigenous peoples, youth, philanthropy, and international organizations in a spirit of shared determination to close the gaps by 2030. Some 85,000 participants attended COP28 to share ideas, solutions, and build partnerships and coalitions. The decisions taken also reemphasize the critical importance of empowering all stakeholders to engage in climate action; in particular through the action plan on Climate Empowerment and Gender.

**Approach of the Conference:** The key outcomes of global climate action arrived at across the four pillars set by the COP 28 Presidency: i) fast-tracking a just, orderly, and equitable energy transition; ii) fixing climate finance; iii) focusing on people, lives and livelihoods; and iv) underpinning everything with full inclusivity.

For the United Nations Climate Change Conference, in a demonstration of global solidarity, negotiators from nearly 200 parties came together in Dubai with a decision on the world's first 'global stock take' to ratchet up climate action before the end of the decade – **with the overarching aim to keep the global temperature limit of 1.5°C within reach.** “Whilst we didn't turn the page on the fossil fuel era in Dubai, this outcome is the beginning of the end,” said UN Climate Change Executive Secretary, Simon Stiell in his closing speech. “Now all governments and businesses need to turn these pledges into real-economy outcomes, without delay.”

COP28 closed with an agreement that signals the “beginning of the end” of the fossil fuel era. An 'Action Agenda' was introduced to accelerate progress towards fair energy transition, make climate finance more accessible, prioritise the well-being of people, nature, and livelihoods, and promote inclusivity in climate action. Salient highlights of the Conference are summarized as below:

#### (a) The Global stock take

The global stock take is considered the central outcome of COP28 – as it contains every element that was under negotiation and can now be used by countries to develop stronger climate action plans by 2025. The stock take recognizes the science that indicates global greenhouse gas emissions need to be cut to 43% by 2030, compared to 2019 levels, to limit global warming to 1.5°C. But it notes Parties are off track when it comes to meeting their Paris Agreement goals.

The stock take calls on Parties to take actions towards achieving a tripling of renewable energy capacity and doubling energy efficiency improvements at a global scale by 2030. The list also includes accelerating efforts towards the phase-down of unabated coal power, phasing out inefficient fossil fuel subsidies, and other measures that drive the transition away from fossil fuels in energy systems, in a just, orderly and equitable manner, with developed countries continuing to take the lead.

In the short-term, Parties are encouraged to come forward with ambitious, economy-wide emission reduction targets, covering all greenhouse gases, sectors and categories and aligned with the 1.5°C limit in their next round of climate action plans (known as nationally determined contributions) by 2025.

#### (b) Helping countries strengthen resilience to the effects of climate change

The two-week-long conference got underway with the World Climate Action Summit, which brought together 154 Heads of States and Government. Parties reached a historic agreement on the operationalization of the loss and damage fund and funding arrangements – **the first time a substantive decision was adopted on the first day of the conference.** Commitments to the fund started coming in moments after the decision was gavelled, totalling more than USD 700 million to date.

There was more progress on the loss and damage agenda with an agreement also reached that the UN Office for Disaster Risk Reduction and the UN Office for Project Services will host the secretariat of the Santiago Network for Loss and Damage. This platform will catalyze technical assistance to developing countries that are particularly vulnerable to the adverse effects of climate change. Parties agreed on targets for the Global Goal on Adaptation (GGA) and its framework, which identify where the world needs to get to in order to be resilient to the impacts of a changing climate and to assess countries' efforts. The GGA framework reflects a global consensus on adaptation targets and the need for finance, technology and capacity-building support to achieve them.



(Contd. from Page 8 - Special Features.....)

### **(c) Increasing climate finance**

Climate finance took center stage at the conference, with Stiell repeatedly calling it the “great enabler of climate action.”

The Green Climate Fund (GCF) received a boost to its second replenishment with six countries pledging new funding at COP28 with total pledges now standing at a record of USD 12.8 billion from 31 countries, with further contributions expected.

Eight donor governments announced new commitments to the Least Developed Countries Fund and Special Climate Change Fund totalling more than USD 174 million to date, while new pledges, totalling nearly USD 188 million so far, were made to the Adaptation Fund at COP28.

However, as highlighted in the global stock take, these financial pledges are far short of the trillions eventually needed to support developing countries with clean energy transitions, implementing their national climate plans and adaptation efforts.

In order to deliver such funding, the global stock take underscores the importance of reforming the multilateral financial architecture, and accelerating the ongoing establishment of new and innovative sources of finance.

At COP28, discussions continued on setting a 'new collective quantified goal on climate finance' in 2024, taking into account the needs and priorities of developing countries. The new goal, which will start from a baseline of USD 100 billion per year, will be a building block for the design and subsequent implementation of national climate plans that need to be delivered by 2025.

Looking ahead to the transitions to decarbonised economies and societies that lie ahead, there was agreement that the mitigation work programme, which was launched at COP27 last year, will continue until 2030, with at least two global dialogues held each year.

### **(d) Strengthening collaboration between governments and key stakeholders**

In parallel with the formal negotiations, the Global Climate Action space at COP28 provided a platform for governments, businesses and civil society to collaborate and showcase their real-world climate solutions.

The High-Level Champions, under the Marrakech Partnership for Global Climate Action, launched their implementation roadmap of 2030 Climate Solutions. These are a set of solutions, with insights from a wide range of non-party stakeholders on effective measures that need to be scaled up and replicated to halve global emissions, address adaptation gaps and increase resilience by 2030.

The conference also saw several announcements to boost the resilience of food and public health systems, and to reduce emissions related to agriculture and methane.

### **(e) Looking ahead**

The negotiations on the 'enhanced transparency framework' at COP28 laid the ground for a new era of implementing the Paris Agreement. UN Climate Change is developing the transparency reporting and review tools for use by Parties, which were showcased and tested at COP28. The final versions of the reporting tools could be available to Parties by June 2024.

COP28 also saw Parties agree to Azerbaijan as host of COP29 from 11-22 November 2024, and Brazil as COP30 host from 10-21 November 2025. The next two years will be critical. During COP29, governments must establish a new climate finance goal, reflecting the scale and urgency of the climate challenge. And at COP30, they must come prepared with new nationally determined contributions that are economy-wide, cover all greenhouse gases and are fully aligned with the 1.5°C temperature limit.

“We must get on with the job of putting the Paris Agreement fully to work,” said Stiell. “In early 2025, countries must deliver new nationally determined contributions. Every single commitment – on finance, adaptation, and mitigation – must bring us in line with a 1.5-degree world.”

“The world needed to find a new way. By following our North Star, we have found that path,” said COP28 President, Dr. Sultan Al Jaber during his closing speech. “We have worked very hard to secure a better future for our people and our planet. We should be proud of our historic achievement.” The COP 28 Presidency intends to ensure that the agreements made at COP 28 are delivered and followed through to COP 29 and COP 30, with mechanisms to track progress against implementation.

*UN Climate Change Press Release-<https://unfccc.int/news> December 13, 2023*

*<https://planet.outlookindia.com/news>, December 14, 2023*

## *Tribute to Prof. M. S. Swaminathan*

Prof. Mankombu Sambasivan Swaminathan, popularly known as Prof. M.S. Swaminathan, the legendary agricultural scientist and a key architect of the 'Green Revolution' in India, passed away on September 28, 2023 at the age of 98.

He is no more but has left behind a lasting legacy in the field of agriculture. A plant geneticist by training, Prof. Swaminathan played a leading role in staving off the threat of famine in India. In collaboration with U.S. scientist Norman Borlaug, he developed new varieties of high-yielding wheat that helped feed millions of people and reduced India's dependence on U.S. food aid. The Indian-born scientist was a key figure in history, ushering in the Green Revolution in India by booming wheat production during the 1960s and helping to establish the institutions needed to conserve crop genetic diversity.

Prof. Swaminathan will always be remembered for his leadership and role in introducing and further developing high-yielding varieties of wheat and rice. Because of his efforts, India transitioned from being drought-stricken and dependent on U.S. imports in the 1960s to being declared self-sufficient in food production in 1971. Prof. Swaminathan achieved the near impossible of making the nation move from 'food scarcity' to 'food surplus' and from national 'despair' to national 'dignity'. He was a great visionary and was able to convince the then government that the high-yielding dwarf wheat introduced by U.S. scientist Norman Borlaug in Mexico was the answer to India's grain shortage. He adapted the seeds to suit Indian conditions and trained farmers in their cultivation. Green Revolution as it unfolded in India was an example of synergy between science, technology, and public policy. Borlaug won the Nobel peace prize for his work, and he credited Prof. Swaminathan for first recognising the potential value in the successful crop varieties.

Prof. Swaminathan also played a crucial role in building India's relationships with international organisations such as the UN Food and Agriculture Organization and the World Bank. "He was a visionary and an inspiring leader," says Khush, who worked with him during his term as the first Asian Director General of the International Rice Research Institute in the Philippines.

He was a scientist steadfast in using knowledge and technology to better the lives of farmers and the rural poor, a policymaker and administrator, a champion of women's causes, a mentor, and a father figure in the field of agriculture. His efforts to improve productivity and profitability in agriculture went beyond technology. During his Chairmanship of the National Commission on Farmers (NCF), one of NCF's key landmark recommendations was to have minimum support prices (MSP) for farmers based on the cost of production plus a 50 per cent return.

Prof. Swaminathan held various responsible portfolios. He served as the President of the Pugwash Conferences on Science and World Affairs, Chairman of the High-Level Panel of Experts (HLPE) of the World Committee on Food Security (CFS), Member of the Indian Parliament (Rajya Sabha), Director General of Indian Council of Agricultural Research and International Rice Research Institute, amongst others. He was awarded the first World Food Prize (1987) for his leadership in India's Green Revolution and numerous other national and international awards, including Padma Shri, Padma Bhushan and Padma Vibhushan, Shanti Swarup Bhatnagar Award, Lal Bahadur Shastri National Award, the Indira Gandhi Prize, Ramon Magsaysa and many more.

As a consequence of the Green Revolution, the agricultural industry witnessed a widespread increase in the use of chemical fertilisers and pesticides. He subsequently concentrated his efforts on an "evergreen" revolution, which he defined as "improvement of productivity in perpetuity without ecological harm". He used the proceeds of the World Food Prize to benefit the nation by setting up the M.S. Swaminathan Research Foundation (MSSRF) in Chennai, India in 1988.

MSSRF aims to advocate sustainable agriculture, transitioning from the 'green' to an 'evergreen revolution' to ensure food and nutrition security for all, alongside the sustainability of global food systems. The MSSRF has long been working for sustainable livelihoods, sustainable production, and sustainable management of biodiversity. Swaminathan's work was not just focussed on farmers, the poor and the rural community, but also encouraged women in agriculture. He motivated women not only to be labourers but also as co-managers. Prof. Swaminathan mooted the idea of the first biotechnology park for women during 1996 that gave a platform for aspiring entrepreneurs.

Prof. Swaminathan emerged as an icon through his role in achieving food security, efforts for biodiversity conservation and safeguarding the wellbeing of people in developing countries, in particular.

## Science, Technology & Innovation News

### ENERGY AND ENVIRONMENT

#### Photo Battery made of Organic Materials with Competitive Voltage

Researchers from the Universities of Freiburg and Ulm have developed a monolithically integrated photo battery using organic materials. Networked intelligent devices and sensors can improve the energy efficiency of consumer products and buildings by monitoring their consumption in real time. Miniature devices like these being developed under the concept of the Internet of Things require compact energy sources to function autonomously. Monolithically integrated batteries that simultaneously generate, convert, and store energy in a single system could be used for this purpose. A team of scientists at the University of Freiburg's Cluster of Excellence Living, Adaptive, and Energy-Autonomous Materials Systems (livMatS) has developed a monolithically integrated photo battery consisting of an organic polymer-based battery and a multi-junction organic solar cell. The photo battery, presented by Rodrigo Delgado Andrés and Dr. Uli Würfel, University Freiburg, and Robin Wessling and Prof. Dr. Birgit Esser, University of Ulm, is the first monolithically integrated photo battery made of organic materials to achieve a discharge potential of 3.6 volts. It is thus among the first systems of this kind capable of powering miniature devices. The team has published their results in the journal *Energy & Environmental Science*.

The researchers developed a scalable method for the photo battery which allows them to manufacture organic solar cells out of five active layers. "The system achieves relatively high voltages of 4.2 volts with this solar cell," explains Wessling. The team combined this multi-junction solar cell with a so-called dual-ion battery, which is capable of being charged at high currents, unlike the cathodes of conventional lithium batteries. With careful control of illumination intensity and discharge rates, a photo battery constructed in this way is capable of rapid charging in less than 15 minutes at discharge capacities of up to 22 milliampere hours per gram ( $\text{mAhg}^{-1}$ ). In combination with the average discharge potential of 3.6 volts, the devices can provide an energy density of 69 milliwatt hours per gram ( $\text{mWhg}^{-1}$ ) and a power density of 95 milliwatts per gram ( $\text{mWg}^{-1}$ ). "Our system thus lays the foundation for more in-depth research and further developments in the area of organic photo batteries" says Wessling.

<https://www.newswise.com>, November 3, 2023

#### Developing Batteries with 10 times the Energy Storage

To meet the rising global demand for electric vehicles, one promising candidate is all-solid-state lithium sulfur batteries. They can store nearly 10 times the amount of energy as traditional lithium-ion batteries, according to researcher Justin Kim.

This type of rechargeable battery uses sulfur, a material that is affordable, readily available, and more environmentally friendly, and it is also significantly safer, according to Kim. This means that your electric vehicle could cost less to purchase, drive longer distances on a single charge, and be a safer ride for your family.

"The fundamental understanding of this type of battery is very limited right now because it's an emerging technology," said Kim. "So, not much is known about their operational mechanism and their failure modes, and this information is really important for designing longer-lasting, high-energy density batteries." Kim and colleagues at Western University used the Canadian Light Source (CLS) at the University of Saskatchewan to analyze what happens inside these batteries when they are in use. They identified which species of sulfur are formed in the battery during its operation and how this could reduce performance or cause the batteries to fail. Their findings were published in *Nature Communications*.

"The research we were able to do at the CLS really enabled us to better understand how these batteries work," said Kim. "With these new insights, we were able to form new design principles that can further improve the battery's performance, including the lifetime of the battery and how much energy it can store." The team is hopeful that they can accelerate the implementation of this new technology into everyday use within the next five to 10 years. "These batteries are a really promising candidate for use in electric vehicles and a lot of new emerging technologies, such as electric aviation," he said.

<https://techxplore.com>, October 31, 2023

### PLASTIC POLLUTION

#### Plastic Waste in Rivers may carry Dangerous Microbes

According to a new study, plastic litter found in rivers might be allowing dangerous pathogens to hitch-hike downstream. The research, which focused on one UK river, discovered that dumped plastic, wooden sticks and the water itself were breeding grounds for communities of microorganisms, potentially providing a reservoir for bacteria and viruses known to cause human diseases and antibiotic resistance.

"Our findings indicate that plastics in freshwater bodies may contribute to the transport of potential pathogens and antibiotic resistance genes," said lead author Vinko Zadjelovic of the University of Antofagasta in Chile. "This could have indirect but significant implications for human health". Antibiotic resistance is a growing public health threat. In 2019, infections related to antibiotic resistance are estimated to have killed 2.7 million people worldwide.

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When plastic ends up in water its surface is overrun within minutes by nearby microbes. The researchers submerged samples for a week in the River Sowe in Warwickshire and West Midlands, England, downstream from a wastewater treatment plant. They found significant differences in the microbe communities depending on the material sampled.

Wastewater is required to be treated and disinfected to reduce microbial hazards and any adverse impacts they might have on human and environmental health. However, the water samples that the researchers collected in February 2020, harbored human pathogens such as Salmonella, Escherichia most commonly known as *E. coli* and Streptococcus responsible for strep throat. This underscores "the pressing need for stricter monitoring of wastewater treatment plants," said Zadjelovic.

Meanwhile, the plastic and wood samples attracted "opportunistic" bacteria such as *Pseudomonas aeruginosa* and *P. aeromonas*, known to pose a risk to people with compromised immune systems. *P. aeruginosa*, which causes infections in hospitalized patients, was found to be nearly three times more abundant on "weathered plastic" that the researchers manipulated to resemble the way plastic breaks down in nature, when compared to the wood. That weathered plastic also showed a greater abundance of the genes responsible for antibiotic resistance.

Rivers are the main way plastic enters the world's oceans, channelling anywhere between 3.5 thousand metric tons to 2.41 million metric tons of the manmade material to the sea annually.

<https://phys.org>, November 4, 2023

## BIOTECHNOLOGY RESEARCH

### Scientists create Artificial DNA

Like adding new letters to an existing language's alphabet to expand its vocabulary, adding new synthetic nucleotides to the genetic alphabet could expand the possibilities of synthetic biology.

The genetic alphabet contains just four letters, referring to the four nucleotides, the biochemical building blocks that comprise all DNA. Scientists have long wondered whether it's possible to add more letters to this alphabet by creating brand-new nucleotides in the lab, but the utility of this innovation depends on whether or not cells can actually recognize and use artificial nucleotides to make proteins.

Now, researchers at Skaggs School of Pharmacy and Pharmaceutical Sciences at the University of California San Diego have come one step closer to unlocking the potential of artificial DNA. The researchers found that RNA polymerase, one of the most important enzymes involved in protein synthesis, was able to recognize and transcribe an artificial base pair in exactly the same manner as it does with natural base pairs. The findings, published on December 12, 2023 in *Nature Communications*, could help scientists to create new medicines by designing custom proteins.

"Considering how diverse life on Earth is with just four nucleotides, the possibilities of what could happen if we can add more are enticing," said senior author Dong Wang, Professor at Skaggs School of Pharmacy and Pharmaceutical Sciences at UC San Diego. "Expanding the genetic code could greatly diversify the range of molecules we can synthesize in the lab and revolutionize how we approach designer proteins as therapeutics."

The four nucleotides that comprise DNA are called adenine (A), thymine (T), guanine (G) and cytosine (C). In a molecule of DNA, nucleotides form base pairs with a unique molecular geometry called Watson and Crick geometry, named after the scientists who discovered the double-helix structure of DNA in 1953. These Watson and Crick pairs always form in the same configurations: A-T and C-G. The double-helix structure of DNA is formed when many Watson and Crick base pairs come together.

"This is a remarkably effective system for encoding biological information, which is why serious mistakes in transcription and translation are relatively rare," said Wang. "As we've also learned, we may be able to exploit this system by using synthetic base pairs that exhibit the same geometry." The study uses a new version of the standard genetic alphabet, called the Artificially Expanded Genetic Information System (AEGIS) that incorporates two new base pairs. Originally developed by Benner, AEGIS began as a NASA-supported initiative to understand how extraterrestrial life could have developed.

By isolating RNA polymerase enzymes from bacteria and testing their interactions with synthetic base pairs, they found that the synthetic base pairs from AEGIS form a geometric structure that resembles the Watson and Crick geometry of natural base pairs. The result: enzymes that transcribe DNA can't tell the difference between these synthetic base pairs and those found in nature. "In biology, structure determines function," said Wang. "By conforming to a similar structure as standard base pairs, our synthetic base pairs can slip in under the radar and be incorporated in the usual transcription process."

The researchers are next interested in testing whether the effect they observed here is consistent in other combinations of synthetic base pairs and cellular enzymes.

"There could be many other possibilities for new letters besides what we've tested here, but we need to do more work to figure out how far we can take it" said Wang.

<https://phys.org>, December 14, 2023

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## AGRICULTURE TECHNOLOGY

### Smart Irrigation Technology Covers “More Crop per Drop”

Placing solutions in the cloud but learning with boots on the ground, the Global Engineering and Research (GEAR) Lab researchers built low-cost, solar-powered irrigation tools to make precision agriculture more accessible.

In agriculture today, robots and drones can monitor fields, temperature and moisture sensors can be automated to meet crop needs, and a host of other systems and devices to make farms more efficient, resource-conscious, and profitable. The use of precision agriculture, as these technologies are collectively known, offers significant advantages. However, because the technology can be costly, it remains out of reach for majority of the world's farmers.

“Many of the poor around the world are small, subsistence farmers,” says Susan Amrose, research scientist at GEAR Lab at MIT. “With intensification of food production needs, worsening soil, water scarcity, and smaller plots, these farmers can't continue with their current practices.”

Amrose, who helps lead desalination, drip irrigation, water, and sanitation projects for GEAR Lab, says these small farmers need to move to more mechanized practices. “We're trying to make it much, much more affordable for farmers to utilize solar-powered irrigation and to have access to tools that, right now, they're priced out of,” she says. “More crop per drop, more crop per area, that's our goal.”

Drip irrigation systems release water and nutrients in controlled volumes directly to the root zone of the crop through a network of pipes and emitters. GEAR Lab has created several drip irrigation technology solutions to date, including a low-pressure drip emitter that can reduce pumping energy by more than 50 percent when compared to existing emitters; a systems-level optimization model that analyzes factors like local weather conditions and crop layouts, to cut overall system operation costs by up to 30 percent; and a low-cost precision irrigation controller that optimizes system energy and water use, enabling farmers to operate the system on an ideal schedule, given their specific resources, needs, and preferences. The controller has recently been shown to reduce water consumption by over 40 percent when compared to traditional practices.

To build these new, affordable technologies, the team tapped into a critical knowledge source—the farmers themselves. “We didn't just create technology in isolation — we also advanced our understanding of how people would interact with and value this technology, and we did that before the technology had come to fruition,” says Amos Winter, associate professor of mechanical engineering and MIT GEAR Lab principal investigator. “Getting affirmations that farmers would value what the technology would do before we finished it was incredibly important.”

The team held “Farmer Field Days” and conducted interviews with more than 200 farmers, suppliers, and industry professionals in Kenya, Morocco, and Jordan, the regions selected to host field pilot test sites. These specific sites were selected for a variety of reasons, including solar availability and water scarcity, and all were great candidate markets for eventual adoption of the technology.

“People usually understand their own problems really well, and they're very good at coming up with solutions to them,” says Fiona Grant, member of GEAR Lab Drip Irrigation team. “As designers, our role really is to provide a different set of expertise and another avenue for them to get the tools or the resources that they need.”

“The way you're going to operate a system is going to have a big impact on the way you design it,” says Grant. “We gained a sense of what farmers would be willing to change, or not, regarding interactions with the system. We found that what we might change, and what would be acceptable to change, were not necessarily the same thing.”

GEAR Lab alumna Georgia Van de Zande, concurs. “It's about more than just delivering a lower-cost system, it's also about creating something they want to use and want to trust.” Knowledge is power for the farmers, for designers and engineers, too. Winter says, “If an engineer can know a user's requirements, they're much more likely to create a successful solution.”

Winter says the technology his team is building is exciting for a lot of reasons. “To be in a situation where the world is saying, 'we need to deal with water stress, we need to deal with climate adaptation, and we need to particularly do this in resource-constrained countries,' and to be in a position where we can do something about it and produce something of tremendous value and efficacy is incredible,” says Winter. “Solving the right problem at the right time, on a massive scale, is thrilling.”

<https://news.mit.edu/2023/>, October 25, 2023

## NUCLEAR ENERGY

### Extracting Uranium from Seawater as another source of Nuclear Fuel

Oceans cover most of the Earth's surface and support a staggering number of life forms and are also home to a dilute population of uranium ions. If we can get these particular ions out of the water - there could be a sustainable fuel source to generate nuclear power. Researchers have now developed a material to use with electrochemical extraction that attracts hard-to-get uranium ions from seawater more efficiently than existing methods.

Nuclear power reactors release the energy naturally stored inside of an atom and turn it into heat and electricity by

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literally breaking the atom apart- a process known as fission. Uranium has become the favoured element for this process as all its forms are unstable and radioactive, making it easy to split. Currently, this metal is extracted from rocks, but uranium ore deposits are finite.

The Nuclear Energy Agency estimates that 4.5 billion tons of uranium are floating around in our oceans as dissolved uranyl ions. This reserve is over 1,000 times more than what's on land. Extracting these ions has proven to be challenging, though, as the materials for doing so don't have enough surface area to trap ions effectively.

So, Rui Zhao, Guangshan Zhu and their colleagues wanted to develop an electrode material with lots of microscopic nooks and crannies that could be used in the electrochemical capture of uranium ions from seawater.

To create electrodes, the team began with flexible cloth woven from carbon fibers. They coated the cloth with two specialized monomers that were then polymerized. Next, they treated the cloth with hydroxylamine hydrochloride to add amidoxime groups to the polymers. The natural, porous structure of the cloth created many tiny pockets for the amidoxime to nestle in and easily trap the uranyl ions. In experiments, the researchers placed the coated cloth as a cathode in either naturally sourced or uranium-spiked seawater, added a graphite anode and ran a cyclic current between the electrodes. Over time, bright yellow, uranium-based precipitates accumulated on the cathode cloth.

In the tests using seawater collected from the Bohai Sea, the electrodes extracted 12.6 milligrams of uranium per gram of water over 24 days. The coated material's capacity was higher than most of the other uranium-extracting materials tested by the team. Additionally, using electrochemistry to trap the ions was around three times faster than simply allowing them to naturally accumulate on the clothes.

The researchers say that this work offers an effective method to capture uranium from seawater, which could open up the oceans as new suppliers of nuclear fuel.

<https://www.acs.org>, December 13, 2023

## INFORMATION SCIENCE

### Inequity in International Science Collaborations

The world's natural-science research ecosystem remains focused on the priorities of high-income countries. Funders, publishers and scholarly databases can do more to rebalance it.

Over the past decade, the importance of improving equity in global research collaborations has gained increased attention worldwide. However, data published by the Nature Index in its first-ever supplement on global north-south research collaborations show just how much work still needs to be done to bridge a yawning gap.

Across the 82 natural-science journals tracked by the index, just 2.7% of articles published between 2015 and 2022 featured collaborations between scientists in higher-income and lower-income countries. Even in these articles, on an average, there were three authors in rich countries for every one author in a poor country. And the number of articles that involved collaborations between researchers exclusively in poorer nations was just 24 — out of a total of some half a million articles.

The Nature Index supplement divides countries into two categories on the basis of four income groups used by the World Bank: the global north, which includes high-income and upper-middle-income countries, and the global south, comprising lower-middle-income and low-income nations.

In articles featuring north-south collaboration, almost half of the author contributions came from just five wealthy countries — China, France, Germany, the United Kingdom and the United States. Among global-south countries, India's contribution represented 15% of all north-south research. By contrast, 42 African countries had a collective contribution amounting to the extent of this inequity must be a wake-up call for funders and publishers, which should not allow the status quo to continue.

The Nature Index tracks publications and authorships, focusing on a selected tranche of journals in which, according to its own data, global-south researchers struggle to publish. It needs to recognize that quality research from the global south might not be reaching this subset of publications, and take steps to address the imbalance. The index is already in the process of broadening the scope of the subjects it covers, and as part of this will consider the publications and other venues through which global-south researchers share their work.

Databases such as the Nature Index that report on north-south collaborations must find ways to measure progress in the representation of researchers in the global south, alongside a broadened subject and publication scope. This could provide a 'feedback loop' for governments and funders to reward those projects helping to move the dial in favour of global-south science.

*Nature* 624, 473 (2023), December 20, 2023

## Brief News

### Insulin-Producing Cells Regenerated in Mice

A study on mouse shows, stimulating nerves connected to the pancreas regenerates insulin-producing cells. Decreasing pancreatic beta cell numbers, the only cells that produce insulin, is a leading cause of diabetes. In a promising development, a research group has revealed that stimulating autonomic vagal nerves connected to the pancreas can improve the function and also increase the number of pancreatic beta cells in mice.

The research findings has been published in the international scientific journal Nature Biomedical Engineering on November 9, 2023.

<https://www.sciencedaily.com>, December 4, 2023

### Medical AI Tool gets Human Thumbs-up

A new artificial intelligence computer program created by researchers at the University of Florida and NVIDIA can generate doctors' notes so well that even physicians couldn't tell the difference, according to an early study from both groups. In this proof-of-concept study, physicians reviewed patient notes - some written by actual medical doctors while others were created by the new AI program, GatorTronGPT that functions similarly to ChatGPT. Wu and his colleagues developed a large language model that allows computers to mimic natural human language.

The research has opened the door for AI to support health care workers with groundbreaking efficiencies.

<https://medicalxpress.com>, November 21, 2023

### Mechanical Engineering Researchers find Better Design for Microsensors

Researchers from Binghamton University and North-eastern University have found a way to improve the tiny sensors used in everything from cellphones and smart watches to biomedical devices. They are used in a variety of everyday devices such as accelerometers, gyroscopes, pressure and vibration sensors. The microscopic devices are designed measuring 1 millimeter that use triboelectric effect. They collect energy from the friction between two micro surfaces and produce a signal when a shock is received. They have improved performance of these devices to have a better sensitivity and robustness.

<https://techxplore.com>, November 15, 2023

### Super Materials for Speedy Chips

A “super atomic” material, in which atoms form clusters that act like the original atoms in some ways, is the fastest semiconductors ever seen. Computer chips made from the material, which contains rhenium, selenium and chlorine atoms, could be thousands of times faster than one used today.

*New Scientist*, November 04, 2023

### U.S. Approval for Gene Editing for Sickle Cell Disease

The U.S. Food and Drug Administration (FDA) has approved for the first time a medical treatment that uses the gene-editing tool CRISPR. The therapy offers a genetic fix for sickle cell disease, which is caused by defects in the oxygen-carrying protein hemoglobin. The product, Casgevy, developed by Vertex Pharmaceuticals and CRISPR Therapeutics, uses CRISPR to turn on a gene for the fetal form of hemoglobin in a lab-grown population of a patient's harvested blood stem cells. The cells are then returned to the body. When FDA announced its decision last week, it also approved another sickle cell therapy— Lyfgenia, from maker bluebird bio—that adds a gene for adult hemoglobin to similar stem cells.

[www.science.org](http://www.science.org), December 14, 2023

### Construction Robot Builds Walls alone

An autonomous robot with big gripper can transform a pile of boulders into huge stone walls without mortar, learns its own how to place each stone. The robotic excavator has built a stone wall 6 meters high and 6 meters long in a public park in Zurich, Switzerland.

*New Scientist*, December 02, 2023

### Scientists Use CRISPR to Make Chickens More Resistant to Bird Flu

A new study highlights both the promises and the limitations of gene editing, as a highly lethal form of avian influenza continues to spread around the world.

Scientists have used the gene-editing technology known as CRISPR to create chickens that have some resistance to avian influenza, according to a new study that was published in the journal Nature Communications. The study suggests that genetic engineering could potentially be one tool for reducing the toll of bird flu, a group of viruses that pose grave dangers to both animals and humans. But the study also highlights the limitations and potential risks of the approach, scientists said.

<https://www.nytimes.com>, October 10, 2023

### *Distinguished Visitors to the NAM S&T Centre*



H.E. Dr. Victor Echeverri Jaramillo, Ambassador of Colombia to India and Ms. Alejandra Rodríguez Sierra



Dr. William VU, 1<sup>st</sup> Secretary, Deputy Head of S&T Office, Embassy of Vietnam to India

## JOINT NAM S&T CENTRE – ICCBS FELLOWSHIP PROGRAMME IN NATURAL PRODUCTS CHEMISTRY, DRUGS AND PHARMACEUTICALS

### CALL FOR APPLICATIONS FOR 2024

The NAM S&T Centre invites applications from suitable candidates for the “**Joint NAM S&T Centre – ICCBS Fellowship Programme in Natural Products Chemistry, Drugs and Pharmaceuticals**” for the year 2024.

This Fellowship is offered to scientists and researchers of the Member Countries of the NAM S&T Centre and the Members of its NAM S&T–Industry Network for affiliation with the International Centre for Chemical & Biological Sciences (ICCBS), H.E.J. Research Institute of Chemistry, and Dr. Panjwani Center for Molecular Medicine and Drug Research, University of Karachi, Pakistan [<http://www.iccs.edu/>] for a period of up to ~3 months to work in the ICCBS Laboratories in the areas of Drugs Research and Development including Natural Products Chemistry and Herbal Medicines; Drugs, Pharmaceuticals and Nutraceuticals; Molecular Medicine, Medicinal Chemistry, Computational Chemistry, Structural Biology, Nanotechnology, Proteomics and Genomics, Clinical Research etc. in order to enhance their research skills, facilitate exchange of information and contacts and create a network between the scientists and researchers from Pakistan and other developing countries.

The Fellowship will be awarded to the scientists *only from the Member Countries of the NAM S&T Centre* and *NAM S&T–Industry Network Members* and only one scientist may be selected from a particular country/Network Member organization. The NAM S&T Centre sponsors up to five scientists each year. While the Centre covers the international airfare of the selected Fellows from its **eligible Member Countries/Network Member organizations**, ICCBS will provide free furnished accommodation and a monthly subsistence allowance of PKR 35,000/- for the duration of the fellowship to each scientist selected under the Fellowship Programme. **There is no last date for submission of applications for the Fellowship.**

**Details on Guidelines of the Fellowship and the Application Form are available at the Centre's Website: [www.namstct.org](http://www.namstct.org).**



## Meetings and Visits of Director General, NAM S&T Centre

### Meeting with Prof. David Jenkins, University of Plymouth, Plymouth, United Kingdom

Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre visited the University of Plymouth (UoP), United Kingdom and met Prof. David Jenkins, Associate Professor, Nano-materials and Devices and Head, Nano-materials and Devices Laboratory, School of Engineering, UoP on November 1, 2023. During the meeting, the possibilities of scientific collaboration between the NAM S&T Centre and UoP were discussed, specifically on organizing an International Training Programme on “Sustainable Water supply for Irrigation: A Developing Countries Perspective” jointly by the University of Plymouth; NAM S&T Centre and JSS Academy of Higher Education and Research (JSS AHER), Mysuru, India sometime in the second half of 2024 in Virtual Mode. Prof. Jenkins welcomed the proposal and agreed to it. The Training Programme will aim at human resource development in the Member Countries of the NAM S&T Centre; Members of the NAM S&T – Industry Network and other stakeholders in the subject - Sustainable Irrigation. It was agreed that the matter would be discussed further between the partners to prepare a detailed plan for the event.

In addition, Prof. Jenkins also agreed to collaborate with the NAM S&T Centre on a publication tentatively titled “One Health in Developing Countries: Role of North-South Cooperation”.

A follow-up virtual meeting was also held on December 11, 2023 to take the above mentioned collaborative initiatives forward.



### Meeting with H. E. Mr. Youdhisteer Munbodh, President, NAM S&T Centre Governing Council and Permanent Secretary, Ministry of Education, Tertiary Education, Science & Technology, Govt. of Mauritius

Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre visited Mauritius during November 21-23, 2023 to participate in the International Conference on “Improving Efficiency and Effectiveness of Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues (IEEHDS-2023)” organised by the NAM S&T Centre, New Delhi in partnership with the JSS Academy of Higher Education and Research (JSS AHER), Mauritius. During the visit, Dr. Bandopadhyay met H. E. Mr. Youdhisteer Munbodh, President, NAM S&T Centre and Permanent Secretary, Ministry of Education, Tertiary Education, Science & Technology, Government of Mauritius in his office in the Ministry and discussed various issues in regard to future scientific programmes of the Centre and various policy matters. Dr. Bandopadhyay had also discussed with Mr. Munbodh the tentative plans for organising scientific events in Mauritius during 2024-26.

Dr. Bandopadhyay invited Mr. Munbodh to visit the NAM S&T Centre in the near future and Mr. Munbodh has kindly accepted the invitation.

## Highlights of the NAM S&T Centre Activities during 2023

### INTERNATIONAL WORKSHOPS/TRAINING PROGRAMMES/CONFERENCES ORGANISED BY THE NAMS&T CENTRE IN COLLABORATION WITH:

1. CSIR- Central Leather Research Institute (CLRI), Chennai, India on '**Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries**' during January 30-31, 2023 in Chennai, India.
2. JSS Academy of Higher Education and Research (JSS AHER), Mysuru, Karnataka, India and the Scientific Committee on Problems of the Environment(SCOPE), Amstelveen, the Netherlands, on '**Combating Plastic Pollution in Terrestrial Environment**' during March 14-15, 2023 in Mysuru, India.
3. International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) under the Auspices of UNESCO, Kuala Lumpur, Malaysia on '**STI Policy Making for Socio-economic Development in the Global South-2023**' during June 6-8, 2023 in Kuala Lumpur, Malaysia.
4. Academy of Scientific Research and Technology (ASRT), Cairo, Egypt on '**Low Cost Technologies for Arsenic Removal from Groundwater**' as a part of the Centre's multilateral collaborative project titled '**Reducing Arsenic Exposure from Food and Water in Developing Countries – A Roadmap for Technological Solutions for the Future**' during September 5-6, 2023 in Cairo, Egypt.
5. JSS Academy of Higher Education and Research (JSS AHER), Mauritius on '**Improving Efficiency and Effectiveness in Health Delivery Systems in Developing Countries: Research, Implementation and Policy Issues (IEEHDS - 2023)**' during November 21-23, 2023 in Mauritius.

### BOOKS PUBLISHED BY SPRINGER NATURE, SINGAPORE

1. **Science, Technology and Innovation Diplomacy in Developing Countries: Perceptions and Practice** - Edited by Dr. Venugopalan Ittekkot (Germany) and Ms. Jasmeet Kaur Baweja (India)
2. **Smart Agriculture for Developing Nations: Status, Perspectives and Challenges** - Edited by Dr. Kandiah Pakeerathan (Sri Lanka)

### FACT FILES PUBLISHED BY THE NAM S&T CENTRE

1. **Birth Defects: A Call for Action**
2. **Rare Diseases: An Emerging Global Health Priority**

### GOVERNING COUNCIL MEETING

1. The **16<sup>th</sup> Governing Council Meeting** of the NAM S&T Centre took place on 27-28 July 2023 in Mauritius and was hosted by the Ministry of Education, Tertiary Education, Science & Technology (MoETEST), Government of Mauritius.

### MoU SIGNED

1. For strengthening the collaborations in Academia, Science, and Technology, the NAM S&T Centre and the Scientific Committee on Problems of the Environment (SCOPE) signed a Memorandum of Understanding in March 2023.

### FELLOWSHIPS AVAILED BY SCIENTISTS FROM THE MEMBER COUNTRIES

1. One scientist from Nepal availed the **Joint NAM S&T Centre-ICCBS Fellowship Programme-2023**
2. Five scientists from Egypt, Iran, Iraq, Mauritius and Sri Lanka availed the **Joint NAM S&T Centre-JSS AHER, Mysuru Fellowship Programme-2023**
3. Two scientists from Indonesia and Malaysia availed the **Joint NAM S&T Centre-ZMT Fellowship Programme-2023**

## *Tentative Activity Calendar Of NAM S&T Centre*

Serial No.	Topic	Venue, Partner Institution and Country	Dates
1.	International Workshop on “Impacts of Climate Change on Small Island Developing States (SIDS)”	IORA Secretariat and Scientific Committee on Problems of the Environment (SCOPE), Mauritius [Virtual Mode]	February 28-29, 2024
2.	International Workshop on “Opportunities to Increase Human Resources Capacity for R&D and Technology Transfer for Sustainable Agriculture and Food Security in Low Income Countries”	National Institute for Scientific and Industrial Research (NISIR), Lusaka, Zambia	April 18-19, 2024 (Tentative)
3.	International Workshop on "Integrated Adaptation Responses to Extreme Climate Events for Developing Economies "	Scientific Committee on Problems of the Environment (SCOPE), South Africa	May 21-23, 2024
4.	International Workshop on “Agricultural Research and Innovation for Resilient Livelihoods in Drylands”	Great Zimbabwe University (GZU), Masvingo, Zimbabwe	June 26-28, 2024
5.	International Workshop on “Role of STI in Poverty Alleviation and Improving Quality of Life”	Human Sciences Research Council (HSRC), Pretoria, South Africa	August 8-9, 2024
6.	International Training programme on “Role of STI for Excellence in Commercialization in Emerging Economies”	International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC), Kuala Lumpur, Malaysia	September 12-14, 2024
7.	International Workshop on “Achieving One Health: Perceptions, Scope, Opportunities and Challenges from Developing World”	Chinhoyi University of Technology, Zimbabwe	November 21-22, 2024

## Centre Announces

# International Workshop on IMPACTS OF CLIMATE CHANGE ON SMALL ISLAND DEVELOPING STATES 28-29 February, 2024, Mauritius [Virtual Mode]



Small Island Developing States (SIDS) are a distinct group of 39 States and 18 Associate Members of United Nations Regional Commissions that face unique social, economic and environmental vulnerabilities.

SIDS have long been recognized by the international community as a special case whose needs and concerns have to be addressed. Although, these countries are among the least responsible of all the nations for the impacts of climate change, they are likely to suffer the most from its adverse effects— such as loss of biodiversity (mainly fisheries that contribute to over half of the GDP of SIDS), coral bleaching, reduced agricultural productivity and food security, human health impacts (such as vector-borne disease and respiratory problems), damage to property and infrastructure, threat to marine resources and tourism that can easily cripple small economies of SIDS.

If the global mean temperature continues to rise due to increased greenhouse gas emissions (mainly carbon pollution), these extreme weather events will become more frequent & intense and the impacts of climate change may worsen in the future.

SIDS are among the parties least responsible for climate change and are dependent on others to ensure that significant action is taken in their support. Consequently, they strive not only to support the process directly but also to ensure that proper action is taken to build the adaptive capacity to tackle the climate related risks. These include reducing greenhouse gas emissions, reducing the carbon footprint, building

seawalls for defense to protect coastal areas from flooding, producing drought-resistant crops and improving early warning systems for extreme weather events.

SIDS need international assistance to help them cope with the impacts of climate change - through capacity building, technology transfer, financial support and availability of other resources to build a more sustainable future.

In view of the above, the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi jointly with Indian Ocean Rim Association (IORA) Secretariat, Mauritius and the Scientific Committee on Problems of the Environment (SCOPE), Amstelveen, the Netherlands announces the organization of a two-days International Workshop on “**Impacts of Climate Change on Small Island Developing States**” during 28-29 February 2024 in Virtual-mode.

The Workshop will be hosted and organized by IORA Secretariat, Mauritius in Virtual-mode.

Scientists and experts desirous of participating in the Workshop from the Member Countries of the NAM S&T Centre should send their applications to the NAM S&T Centre at [namstcentre@gmail.com](mailto:namstcentre@gmail.com) as early as possible but latest by February 9, 2024.

However, interested applicants from SIDS and other Member States of IORA which are not members of the NAM S&T Centre may submit their requests directly to IORA Secretariat only at [kritika.nuckchady@iora.int](mailto:kritika.nuckchady@iora.int).

**More details about the Workshop are available at Centre's Official Website: [www.namstct.org](http://www.namstct.org).**

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