



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

Vol. 30, No. 4 **JANUARY - MARCH 2021** 

# **S&T** Newsletter

# FROM THE DG'S DESK

#### **GREETINGS** to our Esteemed Readers!!



The NAM S&T Centre completed another productive year having undertaken several exciting scientific activities in spite of the unabated threats of the "Pandemic".

The 15<sup>th</sup> Governing Council Meeting of the NAM S&T Centre held on 24 February 2021 (in Virtual Mode) was hosted by the National Science & Technology Commission (NASTEC), Sri Lanka under the guidance of the Ministry of Technology, Sri Lanka. It was a privilege and an honour for the Centre to have His Excellency Gotabaya Rajapaksa, the President of the Democratic Socialist Republic of Sri Lanka, and Honourable Minister of Technology to grace the occasion as the Chief Guest.

of Technology to grace the occasion as the Chief Guest. During the last quarter, the Centre has successfully organized two scientific events (in Virtual Mode) on highly important topics – (i) an International Workshop on "Renewable Energy and Storage Devices for Sustainable Development" jointly with the Amity Institute of Advanced Research and Studies (Materials and Devices), Amity University, Noida, India during 12-14 January 2021 with 188 participants from 22 countries including Armenia, Australia, Belgium, Brazil, Cyprus, Egypt, Germany, India, Iran, Iraq, Italy, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, Palestine, South Africa, Sri Lanka, UAE, United Kingdom, and USA; and (ii) an International Workshop on "Groundwater Conservation and Management by Leveraging Science, Technology and Innovation" jointly with the Kenya National Commission for UNESCO, Nairobi, Kenya during 27-28 January 2021 with 75 participants from 18 countries including Egypt, India, Indonesia, Iraq, Kenya, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, Pakistan, Rwanda, Sri Lanka, Sudan, Tanzania, United Kingdom, Vietnam, and Zimbabwe.

The Centre has recently published a book entitled "**The Role of Science Popularization in Science, Technology and Innovation Policy**". The Centre has also started a new initiative to bring out a biennial publication titled "**NAM STI Bulletin**" and has launched its inaugural issue in January 2021. The issue has focused on "COVID-19" Pandemic and how the Member Countries of the Centre have responded to the challenges faced by them. The periodical will be published to highlight the current trends in "*Science, Technology and Innovation*" and will include research papers and scientific articles contributed by authors from various countries especially from the developing world.

The Centre in partnership with the Center of Excellence on High Voltage Engineering, University of the Witwatersrand, Johannesburg, South Africa; South African Institute of Electrical Engineers - Lightning Chapter; and the Department of Science & Innovation, Pretoria, South Africa will organize an International Roundtable on 'Policy Development in Lightning Hazard Mitigating Strategies in Countries with High Ground Flash Density' during 11-12 May 2021 (in Virtual-Mode).

Several other scientific programmes on a range of topics have been planned by the Centre for the near future and we look forward to receiving nominations for participation from our Member Countries and the global scientific community at large.

We regret the delay in publication of this issue due to COVID-19 Pandemic and other related reasons.

Happy Reading!!

Armitras Bandopullinge X

(Amitava Bandopadhyay) **Director General**  FIFTEENTH MEETING OF THE GOVERNING COUNCIL (GC) OF THE NAM S&T CENTRE, Hosted by Sri Lanka on 24th February 2021

(Virtual Mode)

The 15<sup>th</sup> meeting of the Governing Council (GC) of the Centre for Science and Technology of the Non-Aligned and other Developing Countries (NAM S&T Centre) was held on 24<sup>th</sup> February 2021 in Virtual Mode which was hosted by the Ministry of Technology (MoT), Government of Sri Lanka and the National Science and Technology Commission (NASTEC), Sri Lanka. 96 delegates from 24 countries including Focal Points from Member Countries, representatives from the diplomatic missions of a few countries; Chief Executives and senior officials of various Sri Lankan Ministries and scientific agencies; and

(Contd. on page 2)

# Centre Organised

INTERNATIONAL WORKSHOP ON RENEWABLE ENERGY AND STORAGE DEVICES FOR SUSTAINABLE DEVELOPMENT (IWRESD-2021) 12-14 JANUARY 2021 (Virtual Mode)

The Sustainable Development Goal (SDG) - 7 is a universal call for clean and affordable energy for all nations and for every person on the Earth. The increasing pressure due to rise in population and demand for a better lifestyle have necessitated a need for greater use of energy. This has resulted in mounting pressure on the use of available resources which is now mostly met by fossil fuels. The rate of energy consumption is much higher than it was ever before and the demand is on the rise. There is a negative

(Contd. on page 4)

#### INTERNATIONAL WORKSHOP ON GROUND WATER CONSERVATION AND MANAGEMENT BY LEVERAGING SCIENCE, TECHNOLOGY AND INNOVATION (IWGWCM - STI 2021) 27-28 JANUARY 2021 (Virtual Mode)

The importance of quality water to life on earth cannot be over emphasized, and because of this it has been included in the UN's 17 Sustainable Development Goals of 2030 as Goal No. 6 - Ensure availability and sustainable management of water and sanitation for all and its 8 targets. Water is, therefore, intricately linked directly or indirectly to almost all the SDGs as it is essential to poverty eradication, gender equality, food security, conservation of natural ecosystems and sustainability as a whole. For example, food security is dependent on water security, and this waterfood security nexus is important not only for SDG 2 (Zero



(Contd. from Page 1 - 15th GC Meeting)

representatives of the NAM S&T Centre Secretariat attended the meeting.

At the outset, Prof. Rohan Munasinghe, Commission Member, NASTEC, Sri Lanka welcomed and thanked H.E. Gotabaya Rajapaksa, Hon'ble President and Minister of Technology, Democratic Socialist Republic of Sri Lanka; and Mr. Jayantha De Silva, Secretary, Ministry of Technology (MoT), Sri Lanka for sparing their valuable time to join the GC Meeting, and sought their vision, blessings and guidance to empower and encourage the Member Countries of the NAM S&T Centre to make maximum out of the NAM S&T Centre platform. He also welcomed Dato' Parang Abai Thomas, Deputy Secretary General, Ministry of Science, Technology and Innovation (MOSTI), Malaysia (representing Malaysia as the President of the NAM S&T Centre); other delegates; and distinguished representatives from the diplomatic missions of various countries in Sri Lanka.

Dato' Parang Abai Thomas, Deputy Secretary General, MOSTI, Malaysia, attended the meeting on behalf of Datuk Ir. Dr. Siti Hamisah Bt Tapsir, President of the 14<sup>th</sup> GC of the NAM S&T Centre. In his opening remarks, he congratulated Dr. Amitava Bandopadhyay, Director General, and others in the Secretariat of the NAM S&T Centre for the extensive achievements in implementing the vision and agenda of the Centre during the past three decades for the promotion of mutually beneficial cooperation among the non-aligned and other developing countries. While recognizing the contributions of the NAM S&T Centre, he stated that a large number of Malaysian scientists and researchers have been benefitted through their participation in various scientific activities and fellowship schemes of the Centre, which had made Malaysia as an ideal springboard in positioning herself at the international platform. He assured continued support from Malaysia to the Centre under the new Presidency, and encouraged the Centre and its Member Countries to forge collaboration and expand alliances in emerging areas that are of common interest to the developing world, such as hydrogen powered technology, vaccine and antiviral drug development, fourth industrial revolution, nanotechnology, biotechnology, robotics and cybersecurity.

Mr. Jayantha De Silva, Secretary, MoT, Sri Lanka and Vice President of the 14<sup>th</sup> GC of the NAM S&T Centre welcomed the delegates and distinguished representatives from the diplomatic missions of various countries in Sri Lanka. In his address, he said that the Member Countries of the NAM S&T Centre cover about 45% of the world population which is quite significant, and therefore, whatever the Centre would do would have an impact on the entire world. He further noted that out of 47 countries that are Members of the NAM S&T Centre as of now, only 21 Member Countries were participating in the 15<sup>th</sup> GC Meeting, and efforts should be made to get back the remaining 26 Member Countries on board. He also welcomed the four other countries - Oman, Maldives, Romania and Turkey which are still not Members of the Centre - to attend this important event and invited those counties to join the Centre as Members. Mr. De Silva also stated that His Excellency, the President of Sri Lanka and Honourable Minister of Technology is very keen to support the NAM S&T Centre. He pointed out the need to develop a network to enhance collaboration in Science, Technology and Innovation which could be applicable for the NAM Member Countries to build up a platform for sharing information, knowledge, experience and expertise. He also assured full support to the Centre from his Ministry as well as various other concerned Ministries of Sri Lanka on capacity building programmes and multilateral cooperation, ensuring peace, prosperity and stability in the NAM countries.

Mr. Vedanand Bhurosah, Acting Director, Tertiary Education and Scientific Research Division, Ministry of Education, Tertiary Education, Science and Technology, Mauritius attended the meeting on behalf of Mr. V. Putchay, Permanent Secretary of the Ministry, and Vice President of the 14<sup>th</sup> GC of the NAM S&T Centre. In his remarks, he spoke about the importance of S&T to combat the COVID-19 pandemic, and pointed out the efforts made by the Government of Mauritius, and the high level Ministerial Policy Dialogue jointly organized by the African Union Commission and European Union in this regard. In this connection, he appreciated that the NAM S&T Centre has taken the initiative to publish the inaugural issue of its biennial NAM STI Bulletin devoted on the theme of how the COVID-19 was being handled by various Member Countries through the application of Science & Technology.

Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre expressed gratitude to H. E. the President and Minister of Technology of Sri Lanka, H.E. Gotabaya Rajapaksa; and Mr. Jayantha De Silva, Secretary, MoT for their kind addresses and welcomed senior diplomats and other dignitaries for attending the GC Meeting. He thanked the Government of Sri Lanka, specifically Mrs. Nazeema Ahamed, Focal Point of the NAM S&T Centre in Sri Lanka and Actg. Director/CEO, NASTEC for hosting the Meeting, and appreciated the efforts of the entire team of MoT and NASTEC for the admirable job of shouldering the responsibility of the coordination and day-to-day work in organising the GC Meeting on behalf of the Government of Sri Lanka. Dr. Bandopadhyay also made a presentation giving the details of various activities and performances of the Centre over the last three and half years after the 14<sup>th</sup> GC Meeting.

The Honourable office bearers of the 14<sup>th</sup> GC of the Centre released six publications of the NAM S&T Centre, viz, '30<sup>th</sup> Anniversary Compendium of the NAM S&T Centre' [Eds. Madhusudan Bandyopadhyay and Kavita Mehra]; 'Vaccines in Developing Countries: Needs, Production Capacity and Immunization Strategies'[Eds. by Mahmoud M. Bahgat (Egypt) and Ibeh Bartholomew (Nigeria)]; 'One Health Perspective on Antimicrobial Resistance and Some Strategies for its Mitigation' [Eds. by Hari Mohan Saxena (India) and Simeon Fogue Kouam (Cameroon)]; 'Drug Development from

#### (Contd. from Page 2 - 15th GC Meeting)

Natural Resources: Scope and Challenges' [Eds. by Subba Rao V. Madhunapantula (India)]; 'Sustainability of Leather Sector in Developing Countries' [Eds. by Eucharia Ngozi Oparah (Nigeria)]; and 'The Role of Science Popularisation in Science, Technology and Innovation Policy' [Eds. by Akram Ghadimi (Iran) and Hasan Jawaid Khan (India)].

The Chief Guest, His Excellency Gotabaya Rajapaksa, Hon'ble President, and Minister of Technology, Sri Lanka in his inaugural address *through a video message*, welcomed the delegates and expressed happiness at having been present at such an auspicious occasion of the Ceremonial Opening of the GC Meeting of the NAM S&T Centre. He expressed hope that the Members of the NAM S&T Centre would work closely for enhancing the Centre's role to stimulate and promote joint projects and programmes on bilateral and multilateral basis among the Member Countries in selected fields of special relevance and continuously develop networking between national and regional centres for development and transfer of technology.

HE the President emphasised upon the significance of introducing new technologies, for which the Government of Sri Lanka has established a separate Ministry for Technology, with a view to introducing new technologies in all feasible sectors, enabling them to increase Sri Lanka's market share in the global economy. He mentioned that Sri Lanka has a proud history of indigenous and traditional technologies that are environment friendly and the country is ready to further elevate the level of cooperation between Member Countries of the Centre, especially in introducing and developing new industrial start-ups in various fields, including herbal, and food technology, so as to address the issues faced globally under the current pandemic situations.

H.E. the President added that the NAM S&T Centre could play a greater role in identifying common interest of Member Countries, and create a collaborative mechanism that will be beneficial to all. He further requested the delegates to consider deliberating how best they can collaborate in reaching sustainable development goals under the pandemic, particularly in the area of climate change. He concluded by stating that all the Members of the NAM S&T Centre should work together to attain a better world through cooperation in Science and Technology, and Sri Lanka is committed to continue its support to the initiatives pursued by the Centre to promote Science and Technology cooperation among the developing countries.

At the end of the session, Mrs. Nazeema Ahamed, Actg. Director/CEO, NASTEC, Sri Lanka proposed a vote of thanks to the Honourable President and Minister of Technology, H.E. Gotabaya Rajapaksa; Mr.Jayantha De Silva, Secretary, MoT; other esteemed delegates and participants.

Working Level Meeting of the GC started under the Chairmanship of Dato' Parang Abai Thomas, Deputy Secretary General, MOSTI, Malaysia. During the meeting, Sri Lanka was unanimously elected to hold the office of President of the 15<sup>th</sup> Governing Council of the Centre, and Egypt, Mauritius and Palestine as Vice Presidents.

The newly elected President, Mr. Jayantha De Silva thereafter took over the Chair from Dato' Parang Abai Thomas and conducted deliberations on the remaining parts of the Agenda. He applauded the work of the Centre under the leadership of Malaysia as the President of the 14<sup>th</sup> GC. He stated that the Centre can only move forward by focusing more on technology and science which will play major role in future. He emphasised that the NAM S&T Centre could play an important role in facilitating cooperation between the Member Countries in various areas such as Artificial Intelligence (AI), IoT, Drone Technology, Agriculture, Education and Health etc. He further added that majority of the population in the Member Countries live in rural areas, and therefore, the Centre should focus more in this area through appropriate interventions of Science & Technology. He concluded by stating that all the Members of the Centre should work together to attain a better world through cooperation in technology and science.

The other delegates representing the newly elected Bureau, viz., Prof. Dr. Gina Elfeky, Supervisor, Academy of Scientific Research and Technology (ASRT), Egypt; Mr. Vedanand Bhurosah, Acting Director, Ministry of Education, Tertiary Education, Science and Technology, Mauritius; and H.E. Dr. Hussein A. Al-A'raj, Vice-President, Higher Council for Innovation and Excellence (HCIE), Palestine also made their remarks.

The Governing Council then took up various items of Agenda for discussion. The important decisions of the GC are given below:

The GC discussed and approved the revised "Rules & Regulations" for the Staff of the NAM S&T Centre submitted by the Committee constituted for this purpose. The approved Rules & Regulations will be effective from April 2021.

The GC suggested that the newly elected office bearers and other Members of the GC should personally pursue with other developing countries located in their respective regions which are not Members of the Centre - urging them to join the Centre and further strengthen the efforts on South-South Cooperation.

#### (Contd. from Page 3 - 15th GC Meeting)

The GC congratulated the Centre for inducting five new "NAM S&T – Industry Network Members" during the period after the last GC Meeting held in September 2017. The GC requested the Member Countries to publicize the benefits of becoming Member of the NAM S&T – Industry Network- to the S&T institutions & agencies, and industrial organisations in their countries urging them to join the Network.

The GC expressed satisfaction that in spite of severe problems due to the COVID – 19, the Centre has been able to organize a large number of scientific activities including international workshop and training courses, and publish 13 books after the last GC Meeting, and congratulated the Director General and his team for diligent and efficient working towards successful planning and execution of the Centre's multifarious activities. The GC noted with satisfaction that besides the books published as follow-up of various scientific activities, a 30<sup>th</sup> Anniversary Compendium of the NAM S&T Centre has been published which gives a consolidated account of the historical background, and the highly impressive achievements and accomplishments of the Centre during the last three decades of its fruitful and productive contributions towards *South-South Cooperation in Science, Technology and Innovation*.

The GC expressed happiness to note various initiatives of the Centre to establish International S&T Partnerships with other Inter-governmental Organisations and agencies. In this connection, the President urged the Member Countries and agencies to come forward with relevant proposals for implementation in partnership with the Centre.

Based on the proposals made by various countries and after some deliberations, five international workshops/training programmes (in virtual mode) were accorded in-principle approval. The Centre would follow them up and negotiate with the prospective host countries/agencies for finalisation of exact topics, dates, programmes and other matters. In addition, six more activities proposed by the delegates from Egypt, Indonesia, South Africa, Sri Lanka, and an International Workshop/Training Programme to be organized jointly by the Scientific Committee on Problems of the Environment (SCOPE), Paris, France; JSS University, Mysore, India; and the NAM S&T Centre – were also approved. The proposing countries will send formal proposals to the Centre with the details of the host/organizing institutions, exact topics, tentative dates, etc.

The GC noted the year wise income and expenditure of the Centre and was happy about the efficient financial management by the Centre. It was appreciated that notwithstanding the shortage of financial resources, the Centre has been able to control its expenditure on administrative overheads and utilise a major part of its limited finances to carry out a large number of scientific activities in partnership with other organisations with sharing of costs. The GC expressed serious concern that the Centre had been facing severe financial constraints due to non-payment of the membership subscription by a number of Member Countries. The GC made a strong appeal to the non-paying Member Countries to expedite payment of their membership subscription dues to the Centre.

The President, Mr. Jayantha De Silva thanked all the participants/delegates for their guidance to the Centre and taking part in fruitful and successful deliberations in the GC Meeting. The Director General thanked the Government of Sri Lanka, and in particular, HE the President of Sri Lanka, Gotabaya Rajapaksa; and Mr. Jayantha De Silva, Secretary, MoT; Mrs.Nazeema Ahamed, Actg. Director/CEO, NASTEC; and all officials of the MoT/NASTEC for making excellent arrangements for hosting the meeting in Virtual Mode.

#### (Contd. from Page 1 - Renewable Energy, IWRESD-2021)

balance between source depletion and replenishment by natural processes. The use of fossil fuels as the world's dominant energy supply is damaging the environment and causing changes in global climate patterns.

Therefore, use of alternative methods of energy supply is inescapable. Energy sustainability can only be realized through an inter-relationship between growing economies, the need for environmental protection and increased social responsibilities in order to provide an improved quality of life for current and future generations. The promise of renewable energy can only be realized through significant investments in research and development on alternative, sustainable technologies such as solar, biomass, wind, hydropower, geothermal power, ocean energy sources, solar-derived hydrogen fuel; and the energy storage technologies necessary to operate them competitively.

In order to deliberate on the current trends in clean energy generation, its storage, harnessing and policy related issues, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), jointly with the Amity Institute of Advanced Research and Studies (Materials and Devices) [AIARS (M&D)], Amity University, Noida, India organised a three-day Virtual 'International Workshop on Renewable Energy and Storage Devices for Sustainable Development (IWRESD-2021)' during 12–14 January 2021.

The International Workshop was organized over 3 days with 4 Plenary Lectures, 50 Invited Lectures, 10 Oral Presentations, 2 e-Poster Flash Presentation Sessions, a Session on Industry-Academia-Ministry Meet with a Panel Discussion, and Group Discussion on *Adoption of Resolution*, besides the Inaugural and Valedictory Sessions.

#### (Contd. from Page 4 - Renewable Energy, IWRESD-2021)

Altogether 188 researchers, scientists, experts, academicians and policy makers from 22 countries including Armenia, Australia, Belgium, Brazil, Cyprus, Egypt, Germany, India, Iran, Iraq, Italy, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, Palestine, South Africa, Sri Lanka, UAE, United Kingdom, and USA had participated in the Workshop. This included 99 students and young researchers from various universities and research institutions who had attended the Workshop and made their e-Poster presentations virtually.

In the Inaugural Ceremony, Prof. (Dr.) V.K. Jain, Chairman, IWRESD-2021, and Distinguished Scientist & Professor, AIARS (M&D), Amity University, Noida, welcomed Dr. Ashok K. Chauhan, Founder President, Amity Universities; Dr. Atul Chauhan, President, RBEF & Chancellor, Amity University Uttar Pradesh; and other distinguished guests. This was followed by an address by Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre who welcomed the delegates and said that there is an urgent need for clean and affordable energy for all the nations, and the global targets for the energy systems should be low carbon, renewable-based, and with high efficiency and universal access to all. He expressed concern about the climate change and other issues that are being faced by all the countries due to the increasing use of fossil fuels, and emphasized the need for radical transitions to meet the Sustainable Development Goals (SDGs) - 2030 and to leverage clean energy to bring back blue skies, clean water and healthy cities. He wished everyone a very fruitful and productive exchange of knowledge during the Workshop, and thanked Dr. Ashok K. Chauhan,



Dr. V.K. Jain, and others in the Amity Group, and the Members of the organizing teams for the success of the workshop.

Dr. W. Selvamurthy, President, Amity Science, Technology & Innovation Foundation (ASTIF) and Chancellor, Amity University, Chhattisgarh, in his address thanked Dr. Amitava Bandopadhyay and his team for playing an important role in *South-South Cooperation in Science, Technology and Innovation*. He further elaborated that the focus of the Workshop was on SDG 7 – Clean, Sustainable and Affordable Energy for all; and finding various alternatives to conventional energy sources that can be used without depleting the natural resources and leaving carbon footprint behind.

The Guests of Honour, Dr. Vikram Kumar and Dr. R.K. Kotnala spoke about the purpose of the workshop and the importance of using renewable energy to address the problems of abnormal climate change, environmental pollution issues, and increasing effects of global warming. Dr. Gauri Singh, the Chief Guest said that she was impressed with the extensive range of scientific events conducted by the NAM S&T Centre for the benefit of the developing world, and taking forward the *South-South Cooperation* to meet SDG 2030. She said that solar energy would represent the top most used energy in the near future, and that the renewable energy would continue to dominate the new capacity expansion. She advocated that developing countries should learn from the experience of other countries in the use of '*Green Economic Recovery*', keeping in view that the energy has to be resilient and climate safe. She further emphasized on the importance of energy storage which plays an important role in this balancing act and helps to create a more flexible and reliable grid system.

Dr. Ashok K. Chauhan, Chief Patron, IWRESD-2021, and Founder President, Amity Education Group welcomed the Chief Guest, and the Guests of honour and greeted all the delegates. He expressed his special thanks to Dr. V.K. Jain, Dr. Amitava Bandopadhyay and their teams for their efforts and commitment in organising such a wonderful international workshop on a virtual platform, even during the ongoing pandemic. He appreciated Dr. Bandopadhyay for his efforts & vision and expressed his interest to collaborate with the Centre for other activities in the future. Dr. Atul Chauhan, President, Ritnand Balved Education Foundation (RBEF), and Chancellor, Amity University Uttar Pradesh said that the workshop was being organised because no challenge poses a greater threat to the future of the Earth than climate change; and to tackle the challenge, thousands of renewable energy projects are being implemented in various countries.





Dr. Abhishek Verma, Secretary, IWRESD-2021 and Assistant Professor, Amity University, Noida then released an *Abstract E-booklet* for IWRESD-'21.

The first Session of <u>**Day 1**</u> of the International Workshop commenced with the **Plenary Lecture 1** delivered by Dr. Anjan Ray, Director, CSIR–Indian Institute of Petroleum (CSIR–IIP), Dehradun on the topic "*City Gas Distribution in India - Supply-side and Demand-side Interventions for Economic and Ecological Benefits*". He explained with the help of conventional example of cooking fuel that most of the rural areas in many developing countries still use wood to meet their cooking requirements, but the ideal fuel should be natural gas which is easily available for urban gas distribution with least impact on environment. However, to reduce the cost of importing natural gas, the countries need to make three choices carefully: reduce energy requirements, reduce carbon requirement, and manage supply chain.

**Plenary Lecture 2** was delivered by Dr. R. K. Kotnala on *"Hydrogen Economy Inevitable to Do Away Global Warming with the Usage of Hydroelectric Cell"*. He said that the hydrogen economy is an envisioned future in which hydrogen is used as a fuel for heat and hydrogen vehicles, for energy storage, and for long distance transport of energy. He explained that hydroelectric cell is believed to be 'boon for masses' and has got potential to replace solar cells and fuel cells, and can generate power using only a few drops of water – which is expected to be inexpensive once mass produced, even less than the cost of the solar panel, and does not pollute the environment.

This was then followed by an **Invited Lecture** given by Dr. A. Subrahmanyam, Indian Institute of Technology (IIT), Madras on "*Recycling of renewable energy waste for sustainable future – Challenges and opportunities*" who pointed out that the installations of photovoltaic (PV) solar modules are growing extremely fast as a result of which, the volume of modules that

#### (Contd. from Page 5 - Renewable Energy, IWRESD-2021)

reach the end of their life will grow at the same rate in the near future. Therefore, it has now become significant to find different methods for recycling solar modules in order to reduce the environmental impact of PV waste and to recover some of the value from old modules.

The attendees were then distributed into two breakout groups - two parallel **Technical Sessions**, in which, papers presented were: by Dr. S.S Chandel, Shoolini University, Himachal Pradesh on "*Passive Solar Technologies for enhancing Thermal Comfort and Power Generation in Buildings in Developing Countries*"; Dr. T. V. Ramchandra, Indian Institute of Science, Bangalore on "*Exploration of Environmentally Sound Energy Alternatives*"; Dr. P. K. Bhatnagar, Delhi University on "*Comment on An Efficient MEH-PPV/ZnO Nanorod Based OLED*"; Dr. Kuldeep Singh, CSIR - Central Electro Chemical Research Institute (CSIR-CECRI) on "*Manufacturing of Next Generation Indigenous Lithium-ion Cells: Innovation and challenges for Electric Vehicles & Energy Storage Systems*"; Dr. Amit Kumar, Central University Haryana on "*Metal oxide nanoparticles embedded magnesium nitrate hexahydrate based nanocomposites for solar thermal energy storage application*"; Mr. Joaquin Guillamon, Texas A&M University on the topic "*Electrolyte conditions in Li-ion Batteries in presence of a Thermal Gradient*"; Dr. Asha Anish Madhavan, Amity Dubai on "*Thermal analysis of molten salt synthesized TiO*<sub>2</sub> *nanoparticles embedded in Palmitic acid as phase change material*"; Ms. Omita Nanda, Amity Noida on "Humidity Enabled Graphene based Bilayer Device for Power"; Ms. Shivangi Jha, Bharat Heavy Electricals Limited (BHEL) on "Fine line Printing for Solar Cells with Knotless Screens"; Mrs. Tamalika Panda, Indian Institute of Engineering Science and Technology (IIEST), Shibpur on "*Theoretical Exploration of front grid pattern of c-Si solar cells for reduced metallization cost*"; Dr. Prashant Shukla, Amity Noida on "*Electricity Generation from Rainwater Droplets Utilizing Microporous PTFE Membrane*"; and Mr. Sohail Shaikh Nazim, Amity Dubai on "*A Study of electric vehicles in UAE and its impact on the contemporary world*".

The afternoon session started with the **Plenary Lecture 3** given by Dr. Vikram Kumar, on "*Photovoltaic Research - Indian Perspective*". While giving the status of manufacturing PV in India, he said that currently, a very small fraction of India's domestic manufacturing capacity of 3GW of solar PV energy is utilised, and as of 2020, 38% of India's installed electricity generation capacity is from renewable sources. He explained that even though solar energy is abundant on earth, and Si solar cell has a mature processing technology, excellent reliability and stability, it has a number of disadvantages.

The attendees were then distributed into two breakout groups for two parallel **Technical Sessions**. The papers delivered in these sessions were: by Dr. Mohamed Bayoumy Abdel Kader Zahran, Chairman, National Authority of Remote Sensing and Space Science (NARSS), Ministry of Higher Education and Scientific Research, Cairo, Egypt on "Si SC Fab. Lab. Demonstration and Energy Storage Devices"; Dr. Hla Myo Aung, Director, Renewable Energy Research Department, Department of Research and Innovation – DRI, Ministry of Education, Yangon, Myanmar on "Technical and Economic Characteristic Analysis of Solar PV Mini-Grid System for Off-Grid Rural Electrification"; Dr. Kanchan Saxena, Amity Noida on "Design of a compact, low cost and robust solar simulator using phosphors and high power blue LEDs"; Dr. Subhra Das, Amity Haryana on *"Long Term performance Analysis of Solar Collectors*"; Dr. Carlos F.O. Graeff, UNESP, Brazil on *"Advances in Niobium Oxide Films for Electron"*; Dr. Awadesh Kumar Mallik, Belgium on the topic "Sustainable laboratory grown diamonds for GaN power devices"; Dr. Suman, Amity Noida on "Self-Sustained System to Clean Industrial Waste-Water and Generate Electricity Without any External Source of Energy"; Mr. Basel Yaseen, General Director of Energy Center, Palestine on *"Renewable Energy Applications in Palestine, Opportunities and Challenges"*; Mr. Orseer Tsutsu, Senior Scientific Officer, Federal Ministry of Science and Technology, Nigeria on *"The Pilot Solar Powered Storage Facilities to Curtail Post Harvest Loses in Nigeria"*; and Dr. Rajendra Singh, Clemson University, USA on *"Materials & Processing Challenges and Opportunities for Providing Nearly Free and Sustainable Electric Power To All"*.

**Day 2** of the Workshop commenced with two parallel **Technical Sessions** in which papers presented were on "*Mitigation of Soiling of Solar Panels by applying Superydrophobic Aluminum Oxide thin films and Dry Cleaning by EDS*", presented by Dr. R. Bhattacharya, Indian Institute of Engineering Science And Technology (IIEST), Shibpur, India; "*Rapid Solar Thermal Energy Harvesting Systems using Plasmonic Nanoparticles*" by Dr. V. K. Jain, Amity University Noida; "*Thin film and Si solar cell technologies*" by Dr. A. K. Saxena, Bharat Heavy Electricals Limited (BHEL), India; "*Fabrication Process of CIGS Thin Film Solar Cell*" by Dr. Chetan J. Panchal, the Maharaja Sayajirao University of Baroda, India; "*Polymer Electrolyte Based 3rd Gen Solar Cells*" by Dr. Bhaskar Bhattacharya, Banaras Hindu University (BHU), Varanasi, India; "*A Study on Passivated Emitter Rear Totally Diffused Bifacial Silicon Solar Cell Device Fabrication Technology*" by Dr. H. Dhasmana, Amity Noida; "*The role of the charge transport layers in organic/perovskite solar cells*" by Dr. Udai P. Singh, Kalinga, Bhubaneswar, India; "*Advanced Semiconductor Materials for Solar-to-Hydrogen Production*" by Dr. Siva Karuturi, ANU, Australia; "*Carbon Electroles for Solid State and Flexible Supercapacitors*" by Dr. S.A. Hashmi, Delhi University; "*Advances in Organic Photovoltaic Devices*" by Dr. S. Sundar Kumar Iyer, Indian Institute of Technology Kanpur (IIT-K); "*Exploring cost-effective manufacture of CdS/CdTe solar cell*" by Dr. C. S. Solanki, Indian Institute of Technology Bombay (IIT-B); "*Evolution of Crystalline Silicon Solar Cells for Industry Applications*" by Dr. Vineet Tyagi, Shri Mata Vaishno Devi University; "*Rethinking Energy Storage Systems for Energy Efficient Buildings*" by Dr. Vineet Tyagi, Shri Mata Vaishno Devi University; "*Rethinking Energy for Sustainability*" by Dr. C. S. Solanki, Indian Institute of Technology Bombay (IIT-B); "*Evolution of Crystalline Silicon Solar Cells for Industry Applications*" by Dr. H. Saha, IIEST,

This was followed by the **E-poster Flash Presentation Session 1** in which students and researchers from different universities and institutes presented their posters virtually.

Following this, **Plenary Lecture 4** was delivered by Prof. Chandima Gomes, Professor of High Voltage Engineering, Chair - ESKOM Power Plant Engineering Institute (EPPEI) – HVAC, Director - Center of Excellence in High Voltage Engineering

#### (Contd. from Page 6 - Renewable Energy, IWRESD-2021)

School of Electrical & Information Engineering, University of the Witwatersrand, South Africa on "*Battery Powered, Hydrogen Fuel Cell and Hybrid EVs: The Challenges in Developing a National Policy*". He effectively put forward his idea on how the Electric Vehicles (EVs) can easily be the prime transportation mechanism by 2030. He then talked about the trade-off between two types of EVs - Battery powered, and H<sub>2</sub>-Fuell Cell powered. He also covered the various challenges to develop a national policy and framework on EVs, and compared the advantages and disadvantages of both the types of EVs in terms of charging / filling time and Energy Transition Loss (ETL).

The delegates were then again distributed into two parallel **Technical Sessions** in which papers presented were: by Dr. A.S. Prakash, Principal Scientist, CSIR - Central Electro Chemical Research Institute (CSIR-CECRI) on "*Materials Development for Efficient Energy Storage in Batteries: From Consumer Electronics to Renewable Energy Storage*"; Dr. Subarna Maiti, Principal Scientist, CSIR-Central Salt & Marine Chemicals Research Institute (CSIR-CSMCRI) on "*Solar Thermal Energy for Livelihood Expansion & Sustainability*"; Dr. Roshan Pandey, Program Chief, Satellite Ground Station Center and Small Hydro Power Equipment Testing and Research Laboratory, Faculty of Technology, Nepal Academy of Science and Technology (NAST) on "*Small Hydro Power (SHP) and its Challenges in Nepal*"; Dr. B. Prasad, Chief Consultant - Solar PV on the topic "An Overview of Recycling Technologies for PV Modules in Indian Context"; Dr. Alessandro Romeo, Universita' di Verona, Italy on "*A new era for thin film solar cells*"; and Mr. Maximilian Vorast, Fraunhofer ISE, Germany on "*Agrivoltaics: Experiences from Germany and Europe*".

After this, an **Industry Session: Industry-Academia-Ministry Meet** was conducted which included a brief **Panel Discussion** on "The Future of Renewable Energy Generation and Harvesting – the Road Map" which was moderated by Dr. W. Selvamurthy, and was taken part by several senior scientists, academicians, and important government officials from relevant Ministries of the Government of India.

**Day 3** of the Workshop started with two sessions of **Invited Talks** in which lectures given were: by Dr. Rick Navarro, Texas, USA on "*Poseidon Hydroelectric System*"; Mr. Ravindra Kumar, DLJ, Defence Research & Development Organisation, India on "*Phase change materials for renewable energy storage applications*"; Dr. Sushil Kumar, NPL on "*Photovoltaic Metrology: Solar cell calibration & measurement procedures*"; Dr. Viresh Dutta, IIT Delhi on the topic "*Highly transparent ZnO based TCO layer fabrication using RF magnetron sputtering for solar cell applications*"; Dr. Adarsh Kumar Pandey, Sunway University, Malaysia on "*Role of Thermal Energy Storage in Achieving Sustainable Development Goals*"; Dr. Ahteshamul Haque, Jamia Millia Islamia University, New Delhi on "*Intelligent Control of Converters for Electric Vehicle Charging Station*"; and Dr. O. P. Sinha, Amity University, Noida on "*Nanocomposites based high performance electrode material for the Supercapacitor Applications*".

After the invited lectures, three **Oral Talks** were given by Mr. Vikas Kashyap, Panjab University on "*The Antireflection Coating Effect in Semiconducting SiNWs With Band Gap Modification*"; Ms. Debashrita Mahana, CSIR-NPL, Delhi on "*Synthesis and characterization of Cupric oxide (CuO) and Cuprous oxide (Cu2O) thin films deposited by PVD Process*"; and by Dr. Apurv Yadav, Amity University, Dubai on "*Designing of Photovoltaic System for Cooling Chiller Plant at Amity University Dubai Laboratory*".

After a short lunch break, the Workshop recommenced with the E**-poster Flash Presentation Session 2** in which students and researchers from different universities and laboratories presented their E-posters. 99 students and young researchers participated in the two flash presentation Sessions, and the two presenters who were declared as the winners were: Ms. Monika Dubey and Ms. Anshika Nagar.

This was then followed by the last **Technical Session** of the Workshop in which presentations made were: by Mr. Mohammad Matlabi Naser, Palestinian Electricity Transmission, Palestine on "*Renewable Energy and Storage Devices for Sustainable Development*"; Mrs. Kifah Fayad, Renewable Energy Directorate, Baghdad, Iraq on "*The Implementation of the Family-sized Biogas Plant to Achieve a Sustainable Lifestyle: Case Study in a Farm in Village 37*"; and by Dr. Soteris A. Kalogirou, Cyprus on "*Renewable Energy Systems: Current status and Prospect*".

In a **Group Discussion Session** co-chaired by Dr. V.K. Jain and Dr. Amitava Bandopadhyay, the participants from various countries deliberated upon a "Draft Resolution" prepared by a Scientific Committee, and unanimously adopted the "**Noida Resolution** on **Renewable Energy and Storage Devices for Sustainable Development**" with recommendations for the concerned governments, policy makers, industry, academicians and other stakeholders.

In the Valedictory Ceremony, Dr. V. K. Jain thanked Dr. Ashok K. Chauhan and Dr. Amitava Bandopadhyay for their efforts





(Contd. on page 8)



#### (Contd. from Page 7 - Renewable Energy, IWRESD-2021)

and inputs for giving everyone a platform to discuss on the very important topic of Renewable Energy. Dr. W. Selvamurthy complimented Amity and NAM S&T Centre, and everyone in the Organising Committee for their patience and efforts for making this Workshop possible. He was also impressed by the idea of Resolution - "A Roadmap Document" that the Centre put forward at the end of the Workshop, keeping each important point from the workshop and putting it in such a manner. Dr. Amitava Bandopadhyay, in his concluding remarks said that the Workshop was the 6<sup>th</sup> Virtual International Event that the Centre has organised in spite of all the odds during the pandemic, and added that in follow-up of the Workshop, Amity and the NAM S&T Centre would together bring out a publication in form of a Scopus indexed peer reviewed international book volume. Mr. M. Bandyopadhyay, Senior Adviser, NAM S&T Centre, in his remarks mentioned that it was the second time the Centre was working with the Amity Group, after having organised a Joint International Workshop on Solar Energy in Dubai. He expressed his appreciation for Dr. Abhishek Verma, Amity University and Ms. Nidhi Utreja, Research Associate, NAM S&T Centre for their dedication and hard work in ensuring participation of an impressive number of foreign scientists and making the Workshop a great success. Dr. Abhishek Verma expressed his deepest sense of obligation and gratitude to the Chairmen and other Members of the Organising Committee for their guidance and cooperation which have made the Workshop a huge success.

#### (Contd. from Page 1 - Groundwater Conservation, IWGWCM-STI 2021)

hunger) and SDG 6 (Clean and affordable water and sanitation), but also for poverty reduction (SDG 1) and good health (SDG 3).

Increasing human population is exerting enormous pressure on available water resources leading to the many challenges faced by the water-sector including unsustainable extraction of groundwater leading to decline in aquifers, reduced stream flows, pollution, depletion of groundwater table and surface water resulting in water scarcity and compromised water quality.

Effective management of water resources, therefore, requires application of a combination of strategies beyond the conventional ones including leveraging and deployment of Science, Technology and Innovation (STI).

With emerging advances in STI and its applications especially during this Fourth Industrial Revolution, a paradigm shift is emerging which understands and embraces the role of STI to address existing societal problems and improve the quality of life for current and future generations. The application of STI in groundwater conservation and management is now even more important given the emerging environmental challenges associated with climate change, extreme weather conditions, unpredictable rainfall patterns, water scarcity and land degradation.

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 the Kenya National Commission for UNESCO (KNATCOM), Nairobi, organized an International Workshop on 'Ground Water Conservation and Management by Leveraging Science, Technology and Innovation (IWGWCM - STI 2021)' during 27-28 January 2021. The Workshop was hosted by KNATCOM, Nairobi and organised through web conferencing platform - 'Zoom Meeting'.

The two-day program was organized in different technical sessions to share knowledge and best practices adopted by various NAM and other developing countries for conservation and management of groundwater by leveraging STI. The Workshop aimed to bring together scientists, researchers, policy makers, groundwater engineers, water resource managers and other such representatives from government, academia and industry to: (i) highlight the importance of conservation and management of groundwater to help achieve sustainable development goals; (ii) discuss the current threats and challenges related to sustainable groundwater management; (iii) provide a platform for researchers and practitioners from various disciplines to share their experiences and lessons learnt in the application of STI in groundwater conservation and management; (iv) showcase the application of STI and new innovation systems in groundwater conservation and management; and (v) promote international cooperation in application of STI for groundwater conservation and management.

The Workshop was attended by **75** scientists, researchers, academicians, policy makers and other water-sector professionals from **18** countries namely; **Egypt, India, Indonesia, Iraq, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, Pakistan, Rwanda, Sri Lanka, Sudan, Tanzania, United Kingdom,Vietnam, Zimbabwe** and the host country **Kenya.** 

The **Inaugural Session** started with a Welcome address by the Secretary General/CEO, Kenya National Commission for UNESCO, Nairobi; **Dr. Evangeline Njoka**. In her address, Dr. Njoka observed that, the water crisis has worsened in an inconspicuous manner, putting intense pressure on the available water sources; both the surface water and groundwater. In view of this, she underlined the need to work collectively and deploy emerging STI opportunities in groundwater research, conservation, management for enhanced water security and sustainability.

Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre, in his welcome address, briefed the participants



about the NAM S&T Centre which aims at promoting South-South Cooperation in Science, Technology and Innovation for collective self-reliance of the developing countries; with a predominant focus on 'Sustainable Development Goals (SDGs) -2030'. He expressed his concern about the faster depleting rate of groundwater than its replenishment by the nature and underlined the emerging role of government, academia, industry and civil society of various NAM and other developing countries for effective and efficient management of this increasingly relied-upon natural resource.

Following this, an Official address was given by the Guest of Honour - Director, Water Resources, State Department of Water, Sanitation and Irrigation, Government of Kenya and Chair, Kenya IHP National Committee **Mr. Chrispine Juma**. In his address, Mr. Juma explained the initiative of the Government of Kenya through the Ministry of Water, Sanitation and Irrigation and UNESCO, Nairobi for the implementation of Kenya National Groundwater Mapping Programme (KGMP) which provides a comprehensive database of the nation's groundwater. He highlighted the urgent need to embrace Science, Technology and Innovation for conservation and management of groundwater resources.

A Vote of Thanks was given by Dr. Jaro Arero Co-organiser and host, Director, Natural Sciences, Natural Sciences Programme, Kenya National Commission for UNESCO, Nairobi.

The Workshop comprised of **4 Technical Sessions** under which *3 Keynote Lectures* and *18 paper presentations* were made all deliberating the critical interface between Groundwater Conservation and Management and Science, Technology and Innovation (GWCM-STI).

Technical Session I - 'Role of Science, Technology and Innovation in Groundwater Conservation and Management' was chaired by Dr. Samuel Partey (UNESCO) and Mr. Kosamu Nyoni (Zimbabwe).

Keynote Lecture I titled 'Rainwater Harvesting and Artificial Recharge as a Tool to Sustainable Groundwater Management, with Special Reference to India - A Review' was delivered by Dr. Dipankar Saha, Former Member, Central Groundwater Board (CGWB), Ministry of Water Resources, River Development and Ganga Rejuvenation, Govt. of India. Dr. Saha in his lecture highlighted Rainwater Harvesting and Artificial Recharge as an effective supplyside intervention to combat declining water levels, dwindling well yield, increasing groundwater salinity and other such situations. He discussed in detail various issues on RWH & AR planning and execution such as: (i) Aquifer type, geometry and condition; (ii) Depth to water level, its seasonal behavior and flow regime; (iii) Source water availability in space and time; and (iv) Demand-supply situation of groundwater and socio-economic conditions.

Following the Keynote Lecture I, 4 papers were presented, viz.

'Groundwater Detection Using Geophysical Method in Malaysia' by Dr. Mohamad Faizal Bin Tajul Baharuddin [Lecturer/Principal Researcher, Research Center for Soft Soils (RECESS), Institute for Intergrated Engineering, University Tun Hussein Onn Malaysia]; 'Estimate the Potential of Groundwater to Support the Need of Clean Water for the New Capital of Indonesia, In Penajam, East Kalimantan' by Dr. Arie Herlambang [Researcher in Water and Wastewater, Centre of Assessment and Application Environmental Technology, Agency for the Assessment and Application of Technology (BPPT), Indonesia]; 'Contribution of Electrical Imaging to Decode the Potential Aquifer Locations for Water Security in Semiarid Niger, Africa' by Dr. Tanvi Arora [Scientist, CSIR-National Geophysical Research Institute, India]; and 'Kenya Groundwater Situation, Challenges and Management Efforts' by Dr. Samson O. Oiro [Hydrogeologist and Assistant Technical Coordination Manager – Groundwater, Water Resources Authority, Kenya];

Technical Session II - 'STI and Groundwater Remediation' was a solution-focused session and was chaired by Dr. Tanvi Arora (India).

Under this technical session, 5 papers were presented, viz; 'Removal of Toxic Groundwater Pollutants by Functionalized Micro-Nano Core-Shell Composites' by Prof. (Dr.) Sangeeta Tiwari [Professor, Amity Institute of Applied Chemistry, Amity University Uttar Pradesh, India]; 'Groundwater Quality and Treatment Technologies in Nepal' by Dr. Tista Prasai Joshi [Scientific Officer, Environment and Climate Study Laboratory, Nepal Academy of Science and Technology]; 'Assessment of Water Quality of the Nyando River (Muhoroni-Kenya) using the Water Quality Index (WQI) Method' by Mr. George Oindo Achieng [Quality Assurance Manager, CSI International Ltd., Kenya]; 'Remediation of Heavy Metals from Groundwater: A Review' by Dr. Manishita Das Mukherji [Associate Professor, Amity Institute of Biotechnology, Amity University Rajasthan, India]; and 'Groundwater Parameters Estimation for Nzoia Basin Using Nam Mike 11 Runoff' by Mr. Stephen Mureithi Kivuti [A Civil and Structural Engineering Student; Moi University, Kenya];

Technical Session III - 'Risks to Groundwater and Water Harvesting' was chaired by Dr. Samson O. Oiro (Kenya) and Dr. Ali Abdulridha Al Maliki (Iraq).



(Contd. from Page 9 - Groundwater Conservation, IWGWCM-STI 2021)

**Keynote Lecture II** titled 'Groundwater Monitoring to Achieve Sustainability in Water Resources Management' was given by Senior Programme Specialist and Head of Natural Sciences Sector, UNESCO Regional Office for Eastern Africa, Kenya; **Dr. Jayakumar Ramasamy**. In his lecture, Dr. Ramasamy stated that there is an urgent need to strengthen the current data collection protocols to focus more clearly on the levels, types and modes of groundwater use for municipal and direct drinking water-supply. Professional assessment of groundwater status, trends and risks will be required to interpret the condition of the resource base, whose sustainability is essential for achievement of SDG-6 targets.

Following the Keynote Lecture II 4 papers were presented: 'Contamination of Groundwater and Soil and Risk of Further Transmission due to COVID-19 Infected and Other Burials: Does Sri Lanka's Environment Pose a Unique Risk?' by Ms. Ashara Nijamdeen [Intermediate Research Scientist, Federation for Environment, Climate and Technology, Sri Lanka]; 'Water Reuse Strategies for Groundwater Conservation and Management' by Dr. Choe Peng Leo [Associate Professor, School of Chemical Engineering, Universiti Sains Malaysia]; 'Development of Soil based Rain Water Harvesting Unit to Investigate the Relation of Biological Activities with Cyclicity Sustainability of the System' by Mr. W. A. L. Sunil Karunawardana [Engineer, National Engineering Research and Development Centre of Sri Lanka, Colombo]; and 'Stakeholder Perspectives of the Impact of Integrated Catchment Management (ICM) on River Systems: A Case Study of Chiredzi Sub Catchment, Zimbabwe.' by Mr. Kosamu Nyoni [Senior Lecturer, Gary Magadzire School of Agriculture, Great Zimbabwe University, Masvingo];

Technical Session IV - 'Utilizing Natural Resources for Sustainable Development' was chaired by Dr. Tista Prasai Joshi (Nepal).

Keynote Lecture III titled 'Arsenic Contamination in Groundwater: A Persistent Threat to the Environment and People's Health' was delivered by Dr. Bhaskar Sen Gupta OBE, Professor in Water Technology, EGIS, Heriot-Watt University, Edinburgh Campus.In his lecture, Dr. Bhaskar highlighted the global scenario of arsenic contamination of groundwater and the exposure risk to vulnerable communities; focusing on Bengal delta in India and Bangladesh to be most exposed to arsenic in food chain and drinking water in Asia. Prolonged intake of arsenic-contaminated food & drinking water (above 10 micro-grams per litre) may lead to cancer, cardiovascular disease, neurological disorders as well as other health disorders. Sharing his 30 years long experience in environmental research in developing countries, he discussed the appropriate available technologies like 'Subterranean Arsenic Removal Process' (SAR) for treating contaminated water at an affordable cost.

Following the *Keynote Lecture III* 5 papers were presented, viz.; 'Local Agro Waste as Bio-Adsorbent for Water Treatment' by Mr. Mohammad Shahid Shahrun [Senior Research Officer, Malaysian Agricultural Research & Development Institute (MARDI), Selangor]; 'Water Resources Management in Myanmar.' by Dr. Khin Aye Tue [Deputy Director, Department of Research and Innovation, Ministry of Education, Myanmar] 'Wastewater Treatment of Artificial Sugar Mill Effluent through Medicinal Plant Sweet Flag and Water Hyssop on Floating Wetland Systems.' by Mr. Jhalesh Kumar [Research Scholar, Indira Gandhi Krishi Vishwavidyalaya, Raipur, India]; 'Site Suitability Analysis of Water Harvesting and Aquifer Recharge Using Remote Sensing (RS) and GIS.' by Dr. Ali Abdulridha AI Maliki [Senior Geologists Chief, Environment and Water Directorate, Ministry of Higher Education & Scientific Research, Science and Technology, Iraq]; and 'A Sustainable Integrated Eco-friendly Biotreatment Process for Reuse of Petroleum Production Produced Water and Biofuels Production.' by Dr. Nour Shafik El-Gendy, [Professor, Petroleum and Environmental Biotechnology, Egyptian Petroleum Research Institute, Cairo, Egypt]

The **Concluding Session** was chaired by the Director, Trans-boundary Water Resources, Ministry of Water, Sanitation and Irrigation, Kenya Mrs. Gladys Wekesa; and Director General, NAM S&T Centre; Dr. Amitava Bandopadhyay. Extensive discussions were held, views were exchanged for understanding the key learnings, experience and takeaways from the Workshop. After a comprehensive deliberation, a **'Nairobi Resolution on Ground Water Conservation and Management by Leveraging Science, Technology and Innovation'** was unanimously adopted by the participants with recommendations to the governments, departments, policy makers, end users and key stakeholders.

A Vote of Thanks was given by **Dr. James Njogu,** Deputy Secretary General, Kenya National Commission for UNESCO.

It was concluded that there is a great enormity and severity of water problems in the developing countries. Dissemination of groundwater technologies, monitoring, implementation of regional and national policies on groundwater; including exploration, assessment, conservation and protection is essential for scientific and sustainable development and management of groundwater resources in the developing as well as developed countries.



# H.E. GOTABAYA RAJAPAKSA, PRESIDENT OF SRI LANKA INAUGURATES THE 15<sup>th</sup> GOVERNING COUNCIL MEETING OF NAM S&T CENTRE



The 15<sup>th</sup> meeting of the Governing Council (GC) of the NAM S&T Centre which was held on 24<sup>th</sup> February 2021 (in Virtual Mode) was hosted by the National Science and Technology Commission (NASTEC), Sri Lanka under the guidance of the Ministry of Technology (MoT), Government of Sri Lanka. 96 delegates from 24 countries including representatives from the member countries; diplomatic missions from various countries; and Chief Executives and senior officials of several Sri Lankan Ministries and scientific agencies attended the meeting.

It was a privilege and an honour for all in the Centre to have His Excellency Gotabaya Rajapaksa, the President of the Democratic Socialist Republic of Sri Lanka and Honourable Minister of Technology to grace the occasion as the Chief Guest of the GC meeting. The inaugural address of H.E. the President was played as a video message, a copy of which is reproduced below:

President and the Vice Presidents of the 14<sup>th</sup> Governing Council Secretary, Ministry of Technology, Sri Lanka Director General of NAM S&T Centre Distinguished Delegates Ladies and Gentlemen

It is indeed a pleasure to address the 15<sup>th</sup> Governing Council meeting of the Non-aligned and Other Developing Countries for Science and Technology, with representation from 47 member countries spread over the African, Asian and European continents and Latin American countries to promote South-South cooperation in science and technology.

From the date of inception, I am sure many member states had benefitted by the activities of the NAM S&T Centre. This Centre, as I am made to understand, has so far progressed through various interventions including promotion of mutually beneficial collaboration among member countries and establishing links with national and regional science and technology centres for scientific advancement.

Let me take this opportunity to congratulate the NAM S&T Centre in India for the continuous and sustainable operation of this inter-governmental institutional mechanism from 1989, offering meaningful contributions to the S & T community across borders.

Science and technology-based planning is what was used to build and transform the world. Indeed, technology provides answers to many of the challenges that are taking place in this dynamic world. Current COVID-19 pandemic and the development of different types of vaccines in record time with adequate clinical trials is a living example to show the important role that could be played by science and technology in human life.

It is well known that we face major challenges in introducing new technologies due to high capital investment. Similarly, there is heavy competition developing countries have to face. As a result, our own inventions do not progress much. My government, therefore, has established a separate Ministry for Technology under my purview to introduce new technologies in all feasible sectors enabling us to increase our market share in the global economy.

Exchanging technologies, through a centre of this nature would be a strategic approach to minimize our capital investment in introducing new technologies. Sri Lanka has currently embarked on introducing a scientific approach and technological advancements in major economic sectors such as Information and Communication Technology, agriculture, plantations, and fisheries. We are more than happy to collaborate with other member countries in sharing our best practices in these sectors.

Nevertheless, a country to become a technology-based economy, it is important that local and indigenous technologies are integrated with high-end technologies. Sri Lanka has a proud history of indigenous and traditional technologies that are environmentally friendly. This would further elevate the level of cooperation

between member countries specially in introducing and developing new industrial start-ups in several fields including herbal and food technology so as to address issues in pandemic situations.

The entire world is now moving towards developing strategies and plans to overcome the adverse impacts caused by COVID-19. Sri Lanka is no exception. Fortunately, Sri Lanka has a strong health system to handle pandemics and we also observe that the recent pandemic has presented a greater opportunity for the Science, Technology and Innovation (STI) sector, especially to showcase the abilities of researchers, scientists and inventors in meeting immediate needs of health sector.

In this context, the NAM S&T Centre could play a greater role in identifying common interests of member countries and create a collaborative mechanism that will be beneficial to all. I propose that the NAM S&T Centre expands its scope to accommodate new thinking in line with current requirements of member countries.

I would also like to make a special request to all delegates to consider deliberating how best we can collaborate in reaching our sustainable development goals within this pandemic situation, particularly in the area of climate change since our focus has shifted due to the recent pandemic.

Finally, realizing the mandate of the NAM S&T Centre is our collective responsibility, and it is incumbent upon us to continue the operation of this inter-governmental mechanism and I assure you that Sri Lanka is committed to collaborate in all aspects that are mutually beneficial.

I wish all success to the 15<sup>th</sup> Governing Council Meeting.

Thank you."

### THE NAM S&T CENTRE SIGNS AN MOU WITH ASRT, EGYPT

The NAM S&T Centre, and the Academy of Scientific Research & Technology (ASRT), Egypt have signed a *Memorandum of Understanding (MoU)* on January 15, 2021 in order to expand their collaborative relationship on the basis of established contacts and mutual understanding, especially to take up joint activities to bring out *Scientific Publications* from time to time through mutual assistance and cooperation.

Both the partners recognised the common interest and importance of strengthening cooperation between each other with the purpose of disseminating S&T knowledge and information, specifically in the field of Intellectual Property Rights (IPR) and Geographical Indications (GI). Keeping this in view, following areas of cooperation would be undertaken under the MoU by both the partners:

- \* Facilitate contacts amongst scientific communities in NAM and other developing countries;
- ★ Consult and cooperate for the compilation and preparation of scientific articles/research papers, and country status papers for publishing a book of international standard in the field of Intellectual Property Rights (IPR) and Geographical Indications (GI) with particular interest to developing countries;
- ★ Expand the activity further to bring out publications on any other S&T subjects that are of interest to NAM and other developing countries. The subjects may be decided through mutual consultations between the NAM S&T Centre and ASRT.
- ★ Any other activity related to creation and dissemination of S&T knowledge and information to the scientific community in NAM & other developing countries as well as other stakeholders.

The MoU was signed by Prof. Dr. Mahmoud M. Sakr, President, ASRT, Egypt and Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre.





# New Publication

## The Role of Science Popularization

in Science, Technology and Innovation Policy



## THE ROLE OF SCIENCE POPULARIZATION IN SCIENCE, TECHNOLOGY AND INNOVATION POLICY

Popularisation of Science, Technology and Innovation (STI) is a process of communicating and appropriating scientific and technological knowledge among broad sectors of the population. This process, however, must contribute to an effective integration of a number of historical, cultural, political, social and economic situations; and make such knowledge a central component of the culture of social awareness and collective intelligence.

The possibilities of gaining access to information are changing our vision while transforming the relationship between human beings, and the appropriation and dissemination of knowledge. Today, access to STI related knowledge is synonymous with development, well-being and improving quality of life. In this context, S&T literacy is a social and ethical right of all human beings.

In this context, the NAM S&T Centre has recently published a book on the relationship between science popularization and STI Policy. The book includes 14 papers contributed by researchers, scientists, experts and professionals from 9 different developing countries namely Bhutan, Cuba, India, Iran, Mauritius, Nigeria, Sri Lanka, Togo and Zimbabwe. The book was edited by Dr. Akram Ghadimi, Director, Science Popularisation Department, National Research Institute for Science Policy (NRISP), Tehran, Iran; and Mr. Hasan Jawaid Khan, Chief Scientist and Head of Popular Science Division, CSIR - National Institute of Science Communication and Information Resources (CSIR-NISCAIR), New Delhi, India. The papers give significant insight into various policies and strategies that are being adopted or need to be adopted by the developing countries to ensure effective communication and popularisation of scientific knowledge.

### FOREWORD: Daan du Toit, South Africa

INTRODUCTION: Amitava Bandopadhyay, India PREFACE: Akram Ghadimi, Iran and Hasan Jawaid Khan, India

#### SECTION - 1: STI POPULARIZATION POLICY MAKING

- 1. Popularization of Science, Technology and Innovation in Cuba Héctor Arias Martín
- 2. Science, Technology & Innovation Policies in India: Thrust on Communication & Public Engagement-Hasan Jawaid Khan
- 3. Policy Making on the Popularisation of Science, Technology, and Innovation (STI) in Nigeria S. L. Wali
- 4. Policy-Making in the Area of Popularization of Science: Developing a Rationale Applying the Theory of Public Goods *Vahid Ahmadi*
- 5. Policy Making in Popularization of Science in Iran Akram Ghadimi and Elaheh Hejazi
- 6. The Role of Future oriented Researches in Policy Cycle of Science Popularization Akram Ghadimi and Sahar Kousari

#### SECTION -2: STI POPULARIZATION REPORTS

- 7. Country's Status Report on Policy Making in Popularization of Science, Technology and Innovation (STI), Bhutan Dawa Tshering B
- 8. Building Scientific Temper in Mauritius Dayachand Balgobin
- 9. Science, Technology and Innovation Situation in Togo Yao Adjrah, Sename Dodzi Kossi and Kouami Kokou

#### SECTION-3: STI POPULARIZATION TOOLS

- 10. Use of Visualization as a Tool for Popularization of Science in General Education in Sri Lanka Madawala Liyanage Shanaka Piyatissa, Mdgaparmdjohar and Arun Kumar Tarofder.
- 11. Promoting Science and Technology through Story Narration and Displaying Science History with Animation Hassan Bashiri and Amir-Hushang Heidari
- 12. Impact of Popularization of Science on Knowledge-Based Economy Indicators Nasser Ali Azimi and Elham Fakhremoosavi

#### SECTION-4: STI POPULARIZATION CASE STUDIES

- 13. Awakening the Nation to Genomics Technology: A Case Study of the Next Generation Biomedical Scientist (NGBS) Programme in Zimbabwe M. Ndemera, F. Muzenda, C. Bure, R. Karimanzira and C. Masimirembwa
- 14. Policy Making for Popularization of Traditional Medicinal Knowledge Gloria Susan Cherian

#### TEHRAN RESOLUTION on: Policy Making in Popularisation of Science, Technology and Innovation (STI) in Developing Countries



# Science, Technology & Innovation News WOMEN IN SCIENCE FOR ACHIEVING SDGs

#### International Day of Women and Girls in Science 2021

On 11 February, 2021, the United Nation partners worldwide, women and girls, marked the 6<sup>th</sup> 'International Day of Women and Girls in Science', virtually. This Day focuses on the reality that science and gender equality are both vital for the achievement of internationally agreed development goals, including the 2030 Agenda for Sustainable Development. Theme for the year 2021 was: 'Women Scientists at the forefront of the fight against COVID-19'.

The outbreak of the COVID-19 pandemic has clearly demonstrated the critical role of women researchers in different stages of the fight against COVID-19, from advancing the knowledge on the virus, to developing techniques for testing, and finally to creating the vaccine against the virus. At the same time, the COVID-19 pandemic also had a significant negative impact on women scientists, particularly affecting those at the early stages of their career, and thus contributing to widening the existing gender gap in science, and revealing the gender disparities in the scientific system, which need to be addressed by new policies, initiatives and mechanisms to support women and girls in science.

Over the past 15 years, the global community has made a lot of effort in inspiring and engaging women and girls in science. Yet women and girls continue to be excluded from participating fully in science. At present, less than 30 per cent of researchers worldwide are women. According to UNESCO data (2014 - 2016), only around 30 per cent of all female students select STEM-related fields in higher education. Globally, female students' enrolment is particularly low in ICT (3 per cent), natural science, mathematics and statistics (5 per cent) and in engineering, manufacturing and construction (8 per cent). Long-standing biases and gender stereotypes are steering girls and women away from science related fields. As in the real world, the world on screen reflects similar biases — the 2015 Gender Bias without Borders study by the Geena Davis Institute showed that of the onscreen characters with an identifiable STEM job; only 12 per cent women.

Therefore, in order to achieve full and equal access to and participation in science for women and girls, and further achieve gender equality and the empowerment of women and girls, the UN General Assembly adopted resolution A/RES/70/212 declaring 11 February as the 'International Day of Women and Girls in Science'.

Source: www.un.org; 11 February 2021

### **NATURE & QUANTUM PHYSICS**

#### Green Sulfur Bacteria Exploit Quantum Effects to Survive

Humans need oxygen to live, but for many microbe species, it's the opposite; the tiniest whiff of the reactive element puts their chemical machinery at risk of rusting. Among these is the bacterium *Chlorobium tepidum* (aka green sulfur bacteria), a photosynthesizing microbe (it harvests sunlight to produce the energy needed to survive) that has evolved a brilliant way to safeguard its light-harvesting processes from damage by oxygen.

A group of scientists recently discovered it uses a quantum effect to shift its energy production line into low gear and save its photosynthetic equipment. Quantum effects are a phantom landscape, a world utterly different than our everyday experience of solid reality. The particles that make up our atoms and molecules are far from solid spheres clicking together. They resonate with opportunity and only settle when a particular reaction becomes inevitable. Where the rules of quantum mechanics apply, an object's nature is a smear of possibility until an observation solidifies them into place.

However, until the recent collaborative study by researchers from the University of Chicago and St. Louis's Washington University revealed the green sulfur bacteria's safety mechanism, the scientific community didn't know much about how, and if, a living system exploits the features of quantum mechanics in the name of survival. Their study shows how the bacterium 'tunes' its system to lose energy if oxygen is present to prevent damage. The bacterium uses vibronic mixing (a quantum mechanical effect that involves molecules' vibrational and electronic characteristics coupling) to move energy between two separate pathways. Which pathway it uses depends on the presence of oxygen. With vibronic mixing, the molecules and electronic states mix so wholly that their identities become inseparable. Like this, the bacterium can guide the molecules (energy) where they need to go.

If there is oxygen, the bacterium uses vibronic mixing to steer the energy through a less direct path instead, where the energy can be quenched (dissipated). Like this, the organism loses some energy and is temporarily deprived of energy, but it saves the entire system. The quantum interruption essentially forces the cell to hold its breath until it is clear of oxygen's toxic effects. On the other side, when there's no oxygen around, the bacterium uses vibronic mixing to shuffle the energy flow through the normal pathway that leads to a photosynthetic reaction center full of chlorophyll.

Source: www.intelligentliving.co; 27 March 2021

### **GROUNDWATER AND FOOD SECURITY**

#### Groundwater Depletion in India 'threatens Food Security'

Groundwater is a critical resource for food security, accounting for 60 per cent of irrigation supplies in India, the world's

#### (Contd. from Page 14 - STI News)

largest consumer of underground water, said the study, published in Science Advances. However, unsustainable consumption of groundwater for irrigation and home use is leading to its depletion.

Using high-resolution satellite imagery and census data, the study quantifies the impact of groundwater depletion on cropping intensity. As the second largest producer of wheat, rice and lentils in the world, India accounts for ten per cent of the world's agricultural production with over 600 million farmers dependent on agriculture as a primary source of livelihood. Any huge losses in production will not only affect Indian agriculture but will also threaten food security in South Asia and the world, the study says.

Meha Jain, lead author of the study and assistant professor at the University of Michigan, says "Our results suggest that reductions in crop area will occur largely in the states that grow wheat, potentially leading to substantial reductions in wheat production in the future. This could have ramifications for food security given that India is the second largest producer of wheat globally — and wheat provides approximately 20 per cent of household calories in India."

Sheshshayee Sreeman, professor at the University of Agricultural Sciences (UAS), Bangalore, says studies by other institutions have predicted similar results. "There is an increase in productivity but that unfortunately cannot match the rate at which resources are being depleted. Land resources are being depleted by urbanisation and industrialisation as are water resources." He says, "Multiple approaches are needed — increase in irrigation, improved access to surface water irrigation, increased groundwater recharge, adoption of water conservation strategies and switching to crops that are less water intensive. Our results show that only switching to surface water irrigation will not fully compensate for the loss of groundwater."

Source: www.scidev.net; 18 March 2021

### **CLIMATE CHANGE, ENVIRONMENT AND BIODIVERSITY**

#### Oceans under threat, warns World Meteorological Organization (WMO)

Climate change has hit the world's oceans hard. The ocean drives climate and weather. It absorbs around 90% of excess heat trapped by  $C0_2$ . Climate Change makes it more vulnerable and hazardous.

"About 40 per cent of the global population live within 100 kilometres of the coast - there is an urgent need to protect communities from coastal hazards, such as waves, storm surge and sea level rise" via "multi-hazard" warning systems and forecasting, said Professor Petteri Taalas, WMO Secretary-General.

According to the UN agency, the "blue economy" is estimated at \$3-6 trillion a year, accounting for more than three quarters of world trade and providing livelihoods for more than six billion people. Millions of dollars in goods and hundreds of lives are still lost at sea each year, due to extreme weather conditions such as high winds, large waves, fog, thunderstorms, sea ice and freezing spray, WMO noted.

It described the ocean as "the Earth's thermostat", absorbing and transforming a significant portion of the sun's radiation and providing heat and water vapour to the atmosphere. Although vast ocean currents circulate this heat around the planet, often for thousands of kilometres, human activities have increasingly distorted this natural ocean/atmosphere equilibrium, WMO maintained.

Ahead of World Meteorological Day on Tuesday 23 March, the UN agency highlighted the value of the "24/7 work" of national weather centres in protecting lives and property "not just on land but also at sea".

Despite technological advances that have revolutionized ocean monitoring globally and helped to understand its link to weather and climate, the UN agency cautioned that "big geographical and research gaps" remain in the Global Ocean Observing System, amid increasing demand for forecasts and services.

The COVID-19 crisis made matters worse when in March 2020, governments and oceanographic institutions recalled nearly all oceanographic research vessels home.

Sea level has increased by around 15 centimetres during the 20th century, according to WMO, from glacier melt, the expansion of warmer sea waters and additions from former ice sheets in Greenland and Antarctica. Projections show that sea level rise could be in the order of 30-60 centimetres by 2100; even if greenhouse gas emissions are sharply reduced and global warming is limited to well below 2°C. However, if greenhouse gas emissions continue unabated, the increase will be between 60-110 centimetres.

#### Source: news.un.org; 22 March 2021

#### **Biodiversity at Risk; Threatens Human Survival, UN Forum Hears**

The Director-General of the UN Educational, Scientific and Cultural Organization (UNESCO), Audrey Azoulay opened the UNESCO Forum on Biodiversity by pointing out that one year after its emergence, the COVID-19 pandemic has confirmed what we had already known; "by threatening biodiversity, humanity is threatening the conditions for its own survival". "The pandemic demonstrated that human health depends on the health of living things", she said flagging



that it is "imperative to rethink our development models".

In kicking off the forum, Ms. Azoulay officially launched the 50th anniversary of UNESCO's "Man and the Biosphere (MAB) programme, which envisioned territories where people could create new ways to enhance the relationship between people and nature.

"Fifty years later, this vision is no longer a mere theory, as 275 million people now live in the 714 UNESCO biosphere reserves in 129 countries", she said, adding that together with the 252 World Heritage Sites and geoparks, "six per cent of the world's land mass – equivalent to the surface of China – is protected".

"Our goal is to preserve 30 per cent of the planet in protected areas", Ms. Azoulay said, noting that caring for the planet means preserving the climate, protecting biodiversity and fighting against declining ocean health – another UNESCO priority.

Earlier this year, the UNESCO chief heralded the UN Decade of Ocean Science.

"We now have ten years to better understand and preserve the ocean, to reforge the relationship between humans and the seas and, in the process, to make important strides towards protecting biodiversity and the environment", she said.

UNESCO is also strongly committed to enhancing education programmes dealing with the natural world, and has called on its 193 Member States to "better integrate sustainable development and nature into curricula".

And to guarantee that education gives future generations the tools they need to save the planet, the UN agency is compiling a global framework of best practices in the field.

"Many other important milestones lie ahead of us –and this UNESCO Forum aims to be a launchpad for these major events", she said, pointing to the IUCN World Conservation Congress in Marseille, the COP26 climate summit in Glasgow, and the COP15 biodiversity convention in Kunming.

Many other luminaries lent their voices to amplify the urgency of the situation, including Pope Francis, who urged everyone to see climate change as "much more of a moral than a technical issue".

UN Sustainable Development Goals Advocate, Hindou Oumarou Ibrahim, warned that "if our environment disappears, who we are, our identity, and our way of life will disappear with it". UN Messenger of Peace, Jane Goodall, underscored the need "to develop a new relationship with the natural world and a new relationship with animals". And UN Special Envoy for the Ocean, Peter Thomson, underscored that "we cannot have a healthy planet without a healthy ocean."

Source: news.un.org; 24 March 2021

### **COVID-19 AND HEALTHCARE**

#### India provides COVID Vaccines to the World

As India supplies COVID vaccines to countries in South Asia, the Ministry of External Affairs (MEA), Government of India said that the government is also undertaking contractual supplies of corona virus vaccines to Saudi Arabia, South Africa, Brazil, Morocco, Bangladesh and Myanmar.

India is one of the world's biggest drug makers and has already sent consignments of corona virus vaccines under grant assistance to several countries in South Asia. The country has rolled out a massive vaccination drive, under which two vaccines – Covishield and Covaxin – are being administered to frontline health workers across the country. While Oxford-AstraZeneca's Covishield is being manufactured by the Serum Institute in Pune, Covaxin has been produced by Bharat Biotech.

Maldives and Bhutan were amongst the first nations to get vaccines from India. On 20<sup>th</sup> January, 2021, India had sent 150,000 doses of Covishield vaccine to Bhutan and 1,00,000 doses to the Maldives as grant assistance. The Maldives is the largest Covid-19 assistance recipient in India's neighborhood, including medicine supply, food supply, medical team, training and financial assistance of \$250 million. India also officially handed over 2 million doses of domestically produced Covishield vaccine to Bangladesh.

India also handed over one million doses of corona virus vaccine to Nepal under grant assistance in sync with its 'Neighborhood First' policy, when Nepal gave conditional approval to use Oxford-AstraZeneca's Covishield vaccine manufactured by the Serum Institute of India. The approval coincided with the sixth meeting of the India-Nepal Joint Commission in New Delhi which was attended by Nepalese Foreign Minister Pradeep Kumar Gyawali.

India also dispatched corona virus vaccine to Myanmar and Seychelles. While a consignment of 100,000 doses of the Covishield vaccines were sent to Mauritius, a consignment of 50,000 doses of the Covishield vaccine were dispatched to Seychelles. Apart from this, Sri Lanka has approved the emergency use of Covishield vaccine and has got their batch of vaccines. Furthermore, India also began commercial exports and sent two million doses each to Brazil and Morocco. India is also currently awaiting confirmation of regulatory clearance in Afghanistan, following which vaccines would be supplied.

#### (Contd. from Page 16 - STI News)

India has also shipped out 200,000 doses of COVID-19 vaccines on 26<sup>th</sup> March 2021 to inoculate UN blue helmets serving in peacekeeping missions. The donated AstraZeneca vaccines left Mumbai for the Danish capital of Copenhagen, where they will be safely stored and distributed to UN peacekeepers serving in various missions. India as "a longstanding and steadfast supporter of peacekeeping", UN peacekeeping chief Jean-Pierre Lacroix said, "an effective roll-out of the COVID-19 vaccine to all peacekeepers is a key priority for the United Nations in order to protect our personnel and their capacity to continue their crucial work, help protect vulnerable communities and deliver on their mandates".

#### Source: news.un.org; 27 March 2021

#### COVID-19 Oxygen Emergency Impacting Millions in Low and Middle-Income Countries

Since the beginning of the pandemic, affordable and sustainable access to oxygen has been a growing challenge in lowand middle-income countries (LMICs). COVID-19 has put huge pressure on health systems, with hospitals in many LMICs running out of oxygen, resulting in preventable deaths and families of hospitalized patients paying a premium for scarce oxygen supplies.

Oxygen is an essential medicine, and despite being vital for the effective treatment of hospitalized COVID-19 patients, access in LMICs is limited due to cost, infrastructure and logistical barriers. Health facilities often cannot access the oxygen they require, resulting in the unnecessary loss of lives. Recognizing the central importance of sustainable oxygen supply – alongside therapeutic products such as dexamethasone – for the treatment of COVID-19, the Access to COVID Tools Accelerator Therapeutics pillar (co-led by Unitaid and Wellcome), is taking a new role to coordinate and advocate for increased supply of oxygen, and, in partnership with a WHO-led consortium, announced the launch of a 'COVID-19 Oxygen Emergency Task Force'. It is estimated that more than half a million people in LMICs currently need 1.1 million cylinders of oxygen per day, with 25 countries currently reporting surges in demand, the majority in Africa. This supply was constrained prior to COVID-19 and has been exacerbated by the pandemic.

The task force has determined an immediate funding need of US\$90 million to address key challenges in oxygen access and delivery in up to 20 countries, including Malawi, Nigeria and Afghanistan. This first set of countries has been identified based on assessments coordinated by WHO's Health Emergencies Programme, in order to match in-country need with potential financing, such as through the World Bank and the Global Fund.

The task force brings together key organisations that have been working to improve access to oxygen since the start of the pandemic including Unitaid, Wellcome, WHO, UNICEF, the Global Fund, World Bank, the Clinton Health Access Initiative (CHAI), PATH, the Every Breath Counts coalition and Save the Children. Building on these efforts, partners will focus on four key objectives as a part of an emergency response plan: measuring acute and longer-term oxygen needs in LMICs; connecting countries to financing partners for their assessed oxygen requirements; and supporting the procurement and supply of oxygen, along with related products and services. Other areas in the scope of the taskforce include addressing the need for innovative market-shaping interventions, as well as reinforcing advocacy efforts to highlight the importance of oxygen access in the COVID-19 response.

#### Source: www.who.int; 25 February 2021

#### CSIR - CMERI transfers COVID related technologies for Commercial Production

Along with scientific and technology-based innovations, their commercial production is equally important. In a recent initiative, CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur, India has transferred its COVID-related technologies to Sai Enviro Engineers Pvt Ltd (SEEPL), Tamil Nadu, Zen Medical Technologies Pvt Ltd, Telangana, and Trinity Microsystems Pvt Ltd, New Delhi respectively.

It may be noted that CSIR- CMERI has developed technology for Integrated Municipal Solid Waste Disposal System in modular form depending on the requirement of the end user. The different modules of technology transfer consist of the separation of a solid component from liquid waste utilizing screw based press, regenerative hot air drying system from hot flue gas of pyrolysis plant, briquetting machine, composting of separated solid. CSIR-CMERI has transferred five modules of technology to Sai Enviro Engineers Pvt Ltd for utilization of solid components of liquid waste from sewage treatment plant/effluent treatment plant.

The Oxygen Enrichment Unit developed by the Institute is a device, which concentrates the oxygen from the air around us by selectively removing nitrogen to supply oxygen-enriched air. The concentrated oxygen is delivered to the patient with breathing-related problems through an oxygen mask or nasal cannula to improve oxygenation in the blood. The device may be used in Homes or Hospital type facilities for patients with chronic obstructive pulmonary diseases (COPD), chronic hypoxemia and pulmonary edema. It may be used as an adjunct treatment for severe sleep apnea (in conjunction with a continuous positive airway pressure unit).

CSIR CMERI brings an intelligent, ultra-portable, safe UVC Led based disinfection technology, designed to sterilize germs, right to your doorstep for you and your dear ones to be safe at the touch of a button, either at home or while enjoying a long ride. The design facilitates wireless and sensor based operation with added features for the safety of users. While taking the technology the people from Trinity Microsystems Pvt Ltd, New Delhi appreciated the Institute for coming out with such technology and said that the deployment of this Sterilizer Unit at Schools and Industrial units



would be vital for continuing their businesses during the resurgence of the pandemic.

#### Source: vigyanprasar.gov.in; March 24, 2021

#### Water, Sanitation and Hygiene: Closing the Gap to End Neglected Tropical Diseases

On 22 March, 2021 - World Water Day, the World Health Organization (WHO) released its strategy on water, sanitation and hygiene as part of joint efforts by the water, sanitation and hygiene (WASH) and the neglected tropical diseases (NTD) sectors towards ending these diseases over the next decade. The 'Global Strategy on Water, Sanitation and Hygiene to Combat Neglected Tropical Diseases – 2021-2030' complements the recently launched new NTD road map and aligns with the Sustainable Development Goal targets 6.1 and 6.2 on drinking water and sanitation.

Increased collective action will require stronger political leadership and long-term, smart investments that recognize WASH as a foundational pillar to public health. The objectives of the strategy include:

- Increasing awareness on the co-benefits of WASH and NTDs and engagement at national and global levels
- Sharing data to highlight inequalities, target investment, and track progress
- Generating high quality evidence and embed them within guidance and national strategies
- Joint planning, delivery and evaluation of programmes to enhance accountability, sustainability and equity.

Without clean water and soap, it is difficult to implement simple and effective public health actions that can prevent and manage debilitating NTDs: face-washing for trachoma, a disease which leads to painful, irreversible blindness; limb-washing for lymphatic filariasis, in which worms invade the lymph system and cause severe edema, especially of the legs; wound-washing for rabies, where cleaning the lesion thoroughly after a dog-bite can decrease the chances of infection by the virus from canine saliva; and hand-washing for intestinal worms, whose eggs are ingested with food inappropriately manipulated and contaminated with soil.

Large inequalities in access to WASH continue to persist: at least 2 billion people rely on water supplies that are unsafe; 673 million practice open defecation, and, an estimated 3 billion people have no access to basic hand washing facilities to practice personal hygiene. Currently, several countries plan to set up new coordination systems, and strive to increase the availability and quality of data on WASH and NTDs, to ensure that WASH services are directed at the communities in greatest need.

Source: www.who.int; March 22 2021

### SUSTAINABLE & CLEAN ENERGY AND ENERGY STORAGE

#### **Empowering Southern Africa's Next Generation of Renewable Energy Entrepreneurs**

Southern Africa holds significant promise for renewable energy development. In recent years, the region has increased its share of renewables in power generation from 23 per cent six years ago to 40 per cent today, however its resource abundance means much more is possible. With enabling policy and investment steps, IRENA analysis shows the region could achieve a 90 per cent share of renewables in total primary energy by 2050 – aligning regional development with the low-carbon growth necessary to ensure an inclusive and sustainable future – growing jobs, improving livelihoods and deepening energy access.

Despite this potential, regional electrification rates remain a challenge and broader renewable energy investment trends in sub-Saharan Africa are low relative to global investment trends. Average annual investments of around USD 6 billion were directed at renewable energy technologies in the period from 2013-2017. To drive the acceleration of Southern Africa's energy transition, bolster energy access and develop the region's sustainable energy ecosystem, IRENA and the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) are implementing the SADC Renewable Energy Entrepreneurship Support Facility.

The Facility aims to support renewable energy market development in Southern Africa through technical support for small and medium sustainable energy business owners. Through technical and financial guidance delivered through tailored workshops, the facility will improve entrepreneurs' understanding of how to effectively engage financial institutions and secure financing. It will also help broker productive relationships between regional entrepreneurs and relevant financial institutions, support strong business ideas and help small business owners scale their operations.

Source: www.irena.org; March 07 2021

#### Big Breakthrough in 'Massless' Energy Storage

Researchers from Chalmers University of Technology have produced a structural battery that performs ten times better than all previous versions. It contains carbon fiber that serves simultaneously as an electrode, conductor, and loadbearing material. Their latest research breakthrough paves the way for essentially 'massless' energy storage in vehicles and other technology.

The batteries in today's electric cars constitute a large part of the vehicles' weight, without fulfilling any load-bearing function. A structural battery, on the other hand, is one that works as both a power source and as part of the structure – for example, in a car body. This is termed 'massless' energy storage, because in essence the battery's weight vanishes when it becomes part of the load-bearing structure. Calculations show that this type of multifunctional battery could greatly reduce the weight of an electric vehicle.

The development of structural batteries at Chalmers University of Technology has proceeded through many years of research, including previous discoveries involving certain types of carbon fiber. In addition to being stiff and strong, they also have a good ability to store electrical energy chemically. This work was named by Physics World as one of 2018's ten biggest scientific breakthroughs. The first attempts to make a structural battery were made as early as 2007, but it has so far proven difficult to manufacture batteries with both good electrical and mechanical properties. However now, the development has taken a real step forward, with researchers from Chalmers, in collaboration with KTH Royal Institute of Technology in Stockholm, presenting a structural battery with properties that far exceed anything yet seen, in terms of electrical energy storage, stiffness and strength. Its multifunctional performance is ten times higher than previous structural battery prototypes.

The battery has an energy density of 24 Wh/kg, meaning approximately 20 percent capacity compared to comparable lithium-ion batteries currently available. But since the weight of the vehicles can be greatly reduced, less energy will be required to drive an electric car, for example, and lower energy density also results in increased safety. And with a stiffness of 25 GPa, the structural battery can really compete with many other commonly used construction materials.

#### Source: phys.org; March 22 2021

# New Initiative NAM STI BULLETIN

The NAM S&T Centre has the mandate to act as a clearing-house of information regarding technological capabilities of non-aligned and other developing countries with a view to promoting technological cooperation and transfer of technology among them. In order to fulfil this objective, the Centre has been publishing a number of scientific and technical books, monographs, state-of-the art reports and proceedings in various S&T subjects.

The NAM S&T Centre has recently taken up another such initiative of publishing a biennial series - NAM STI Bulletin that is proposed to be brought out every year in January and July. The objective of the STI Bulletin is to have a document to provide the latest status on South - South Cooperation in Science, Technology & Innovation (STI), STI Diplomacy and useful information on related issues especially that are of interest to the developing world.

The inaugural issue of NAM STI Bulletin was devoted to a common theme: 'Role of Science, Technology and Innovation in Combating the COVID-19 Pandemic' which was released on February 05, 2021. This is a special issue which focused on the management of COVID – 19 Pandemic in the NAM and other developing countries.



Dr. Anjan Ray Director, Council of Scientific and Industrial Research – Indian Institute of Petroleum (CSIR-IIP), Dehradun, India



Dr. Sirous Vatankhah Moghaddam, President, CPDI, Tehran, Iran along with a senior official of CPDI, and **Dr. Amir Hossein** Mirabadi, Head of Technological and Innovation Cooperation Section, Embassy of the IR of Iran, New Delhi, India.



# **TENTATIVE ACTIVITY CALENDAR OF THE NAM S&T CENTRE**

Serial No.	Торіс	Venue, Partner Institution and Country	Dates
1.	International Workshop on "Energy Security and Energy Access: Health Implications of Poor Energy Quality in Developing Countries"	<b>[Virtual Mode]</b> CSIR-Indian Institute of Petroleum, Dehradun, India	26-27 July 2021
2.	International Workshop on "Smart Agriculture for Developing Nations: Broader perspectives and special challenges for Island States"	[ <b>Virtual Mode</b> ] Ministry of Education, Tertiary Education, Science and Technology, Mauritius	11-12 August 2021
3.	1 <sup>st</sup> Bureau meeting of the 15 <sup>th</sup> Governing Council (GC) of the NAM S&T Centre	(Virtual Mode) Academy of Scientific Research and Technology (ASRT), Egypt	21 September 2021
4.	International Exposure Conference on Application of Ocean Science and Technology for the Practice of Sustainable "Blue Economy" in Developing Countries	<b>[Virtual Mode]</b> Scientific Committee on Oceanic Research (SCOR) USA	8-9 November 2021
5.	International Workshop on "Technology Transfer and Commercialization"	<b>[Virtual Mode]</b> Ministry of Research and Technology / National Research and Innovation Agency, Indonesia	7-8 December 2021
6.	International Workshop on STEM Education through Virtual Mode	<b>[Virtual Mode]</b> Myanmar Engineering Council (MEC), Myanmar	2021/22
7.	International Workshop on "Gender Issues in Water Management in Developing Countries and Sustainable Development"	Scientific Committee on Problems of the Environment (SCOPE), Paris, France; JSS University, Mysore, India	February 22-24, 2022
8.	International Workshop on "Cyber Security"	Ministry of Technology, Sri Lanka	2022

EDITOR: Mr. Madhusudan Bandyopadhyay **Associate EDITORs:** Mr. Abhay Nambiar & Ms. Nidhi Utreja **CONTRIBUTORs:** Dr. Kavita Mehra and Ms. Jasmeet Kaur **COMPILATION & DESIGN:** Mr. Pankaj Buttan **PUBLISHED BY:** Dr. Amitava Bandopadhyay, Director General, Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), Core 6A, 2<sup>nd</sup> Floor, India Habitat Centre, Lodhi Road, New Delhi-110003 (India) **Ph:** +91-11-24645134, 24644974, Fax: +91-11-24644973 E-mail: namstcentre@gmail.com **\*** Website: http://www.namstct.org

Lovely Printers, New Delhi, E-mail: lovelyprintersindia@gmail.com; Ph: 9811086866.