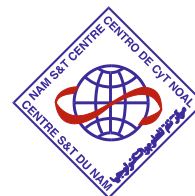


NAM

S&T Newsletter



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

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FROM THE DG'S DESK

Warmest Greetings to all our Esteemed Readers!!



It gives me a great pleasure to present before you the first issue of the NAM S&T Newsletter for the year 2023.

During the first quarter of the year, the NAM S&T Centre successfully organised an International Training Workshop on “Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries” jointly with the CSIR-Central Leather Research Institute (CLRI), Chennai, India during 30-31

January 2023 in Chennai. Altogether, 80 researchers, scientists, experts, academicians and policymakers from 11 developing countries participated in the Training Workshop. Recommendations on sustainable manufacturing of footwear and leather products were made to the concerned ministries/departments, agencies and other authorities.

Another International Workshop on “Combating Plastic Pollution in Terrestrial Environment” was organised by the NAM S&T Centre in partnership with the JSS Academy of Higher Education and Research (JSS AHER), Mysuru, India and the Scientific Committee on Problems of the Environment (SCOPE), Amstelveen, the Netherlands during 14-15 March 2023 in Mysuru. The Workshop was attended by 150 scientists, researchers, academicians, policymakers and other professionals from 10 NAM and other developing countries. Several important recommendations on combating plastic pollution in terrestrial environment were made to the governments, academic/research institutions, policymakers and other key stakeholders.

To further strengthen the cooperation in the broad fields of academics, science and technology, a **Memorandum of Understanding** was signed between the NAM S&T Centre and SCOPE, Amstelveen.

I am happy to announce that the Centre has recently published two books, viz. (i) **Science, Technology and Innovation Diplomacy in Developing Countries: Perceptions and Practice** - edited by Dr. Venugopalan Ittekkot (Germany) and Ms. Jasmeet Kaur Baweja (India). The book provides a perspective of developing countries on the internationalization of STI Diplomacy and highlights the significance of international cooperation at bilateral, regional, and multilateral levels; and (ii) **Smart Agriculture for Developing Nations: Status, Perspectives and Challenges** - edited by Dr. Kandiah Pakeerathan (Sri Lanka). The book provides information to make the farming system more technology connected & intelligent and help to achieve the overall sustainability of agriculture sector in developing countries including SDG-2. Both these books have been published by Springer Nature, Singapore.

Considering the importance of the topic of socio-economic relevance, the NAM S&T Centre has published its second Fact File titled “**Birth Defects: A Call for Action**” jointly with the JSS Medical College, Mysuru, India. The document provides a comprehensive overview of birth defects; its types and causes; relevance of genetic surveillance and the need for capacity building in the area in developing countries.

The NAM S&T Centre in collaboration with International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) under the Auspices of UNESCO, Kuala Lumpur announces the organisation of an International Training Programme on “**STI Policy Making for Socio-Economic Development in the Global South – 2023**” during June 6-8, 2023 in Kuala Lumpur, Malaysia.

Happy Reading!!

Amitava Bandopadhyay
(Amitava Bandopadhyay)
Director General

Centre Organised

International Training Workshop on Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries

30-31 January 2023
Chennai (Tamil Nadu), India

The history of the leather goods industry shows very clear changes in materials and end applications, from the usage of leather goods for particular functional objectives to the contemporary market for luxury items. Raw materials used in the leather goods industry are as diverse as the products. The growing



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International Workshop on Combating Plastic Pollution in Terrestrial Environment

14-15 March 2023
Mysuru (Karnataka), India

With mounting evidences that plastic waste is rising and the accumulation of plastics in our natural environment is getting worse, the plastic pollution dilemma has recently taken centre stage in the discussions of global policy. As a result, presently more attempts are being made to identify the international



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demand for leather footwear, as well as the fact that this demand competes for raw material with other products, appears to be a significant business opportunity for developing countries including the African continent. It may also be noted that for developing nations, the footwear sector is a significant source of employment.

The leather industry in developing nations has also grown significantly in recent decades. Although the manufacturing of leather goods is increasing in developing nations, there are still many factors that have an adverse impact on the performance of the leather industry in many of these nations, most notably a lack of high-quality raw materials, frequent breakdowns and power shortages, a lack of adequate manufacturing knowledge and technological expertise, as well as environmental impacts and trade barriers.

In order to address the above issues, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi, India jointly with CSIR-Central Leather Research Institute (CLRI), Chennai, India organized an international training workshop on *"Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries"* in Chennai, India during **30-31 January 2023**.

The International Training Workshop was organized over a period of 2 days and aimed to bring together experts and various stakeholders to deliberate on emerging trends in new material innovations, intelligent manufacturing, including concepts from Industry 4.0 and Artificial Intelligence, quality control, testing, and standards for materials used in footwear and leather products, as well as ethics, social responsibility, and sustainability for the manufacturing sector. Altogether around **80** researchers, scientists, experts, academicians and policy makers from **11** countries including **Egypt, India, Indonesia, Mauritius, Myanmar, Nigeria, Palestine, Sri Lanka, Uganda, Vietnam, and Zambia** had participated in the Workshop. This included around 31 participants who had attended the Workshop virtually.

During the Inaugural Session, **Dr. K. J. Sreeram**, Director, CLRI welcomed the participants. He briefly highlighted the importance and growth of Leather Industry in India and contributions of CLRI towards the Leather Sector. **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre, in his address, welcomed the distinguished speakers and other participants and gave the genesis of the event. He briefly described the functions and activities of the NAM S&T Centre, which is an inter-governmental organization based in New Delhi. The Chief Guest, **Mr. P. R. Aqeel Ahmed**, Chairman, Leather Sector Skill Council, Chennai in his address said how leather designs and quality can be upgraded to bring out the best, and drew attention to the fact that business cannot run without the involvement of academia. **Mr. N. R. Jagannathan**, President, Indian Leather Technologists' Association (ILTA) - Southern Region, Chennai briefly discussed the triple helix structure of Collagen, on which CLRI is currently working on. Further, he talked about the importance of R&D sector of the leather industry.

The Workshop was conducted with 5 Technical Sessions, 6 Keynote Lectures, 19 Paper Presentations, Concluding Session and Adoption of Resolution.

The five Technical Sessions were 'Emerging Scenarios in New Material Innovations'; 'Intelligent Manufacturing including Artificial Intelligence and Industry 4.0 Concepts'; 'Trends in the Design of Footwear and Leather Products and Accessories for Fashion and Value Addition'; 'Quality Control, Testing and Standards for Materials in Footwear and Leather Products' and 'Ethics, Social Responsibility and Sustainability for the Manufacturing Sectors'. These sessions were respectively chaired by **Mr. V Muthukumar**, Farida Shoes (P) Limited, (India) and Co-chaired by **Dr. Tamer Mostafa Samir Abd El Hamid Hamouda**, National Research Centre & Academy of Scientific Research and Technology, Cairo (Egypt); **Mr. M Elangovan**, Director TM Consulting, (India) and Co-chaired by **Dr. Jerry Tagang**, Director, Nigerian Institute of Leather and Science Technology (Nigeria); **Dr. Kaustav Sengupta**, National Institute of Fashion Technology (India) and co-chaired by **Mr. Asem G. Abuomar**, Leather and Footwear Products Development Centre (Palestine); **Mr. C Anbu Malar** (India) and co-chaired by **Dr. Than Than Aye**, Ministry of Science and Technology (Myanmar) and **Mr. M. Abdul Wahab** (India) and co-chaired by **Dr. (Mrs.) Anagha Vaidya Soocheta**, University of Mauritius, (Mauritius).

The first Keynote Lecture was delivered by **Mr. V. Muthukumar** (India) on 'Emerging Scenarios in New Material Innovations' during Technical Session I who talked about the growing footwear industry and the new market trends. During Technical Session II, Keynote Lecture 2 was delivered by **Mr. M. Elangovan** on '3P and IoT in Footwear Industry'. Following this, Keynote Lecture 3 was presented by **Mr. Ramesh Subramaniam**, Formerly Executive Director FDDI, (India) on 'Intelligent Manufacturing including Artificial Intelligence and Industry 4.0 Concepts'. Keynote Lecture 4 was delivered by **Dr. Kaustav Sengupta** from India on 'Trends in the Design of Footwear and Leather Products' during Technical Session III.

At the beginning of Technical Session IV a Keynote Lecture was delivered by **Mr. C. Anbu Malar**, Director, P A Footwear P Ltd., Chennai (India) on 'Quality Control, Testing and Standards for Leather in Footwear and Leather Products.' The sixth Keynote Lecture was delivered by **Mr. M. Abdul Wahab**, Vice President, Indian Shoe Federation & Managing Director, KH Exports India Pvt. Ltd., Chennai (India) on 'Ethics, Social Responsibility and Sustainability for the Manufacturing Sectors' during Technical Session V.

There were 11 presentations by the Indian participant scientists from CSIR-CLRI, Chennai: **Mr. Suresh Kumar**; **Mrs. K. Ambika**, **Dr. D. Suresh Kumar**, **Mr. S Nithyanantha Vasagam**, **Mr. Vishnu Kumar**, **Mr. M. Akshaya Raman**, **Mr. K. Karthikeyan**, **Dr. G. Saraswathy**, **Mrs. K. Ambika**, **Mr. C. M. Rajesh**, and **Mr. G Bharathkumar** and they respectively presented papers on 'Using Natural Fabrics as Alternative Materials in Footwear Production'; 'Design & Development of Palm Leaf and Leather Combination Products - A New Makeover to Indian Palm Leaf Crafts'; 'Automation of Footwear Design & Manufacture using Sophisticated CAD/CAM Tool'; 'Prediction of India's Leather Footwear Export for the Year 2030 in Terms of Quantity using Recurrent Neural Network based Model'; 'Towards next-generation Manufacturing in Footwear Industry'; 'Standardisation of Leather Product Sample Development Process through Industrial Engineering Techniques'; 'Additive Manufacturing Driven Fashion Products Design and its Futuristic Applications in Wearable Lifestyle Accessories Exclusively for Footwear Sector'; 'Footwear based on

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Person's Gait: Recent Trend in the Design of Footwear'; 'Design Interventions for Sustainable Fashion Lifestyle Products – A Case Study on Project GOAT by CSIR-CLRI'; 'Quality Control in Footwear by Using Best Practices' and 'Physical Testing Standards for Footwear Components'.

A presentation from Indonesia was on '*Commercialization of Leather based Technologies*' by **Mr. Raden Agus Sampurna**, National Research and Innovation Agency (BRIN). **Dr. Than Than Aye**, Director, Department of Research and Innovation, Ministry of Science and Technology, Myanmar presented a paper on '*Investigation for Preparation of Wild Riding Boots by Footwear Recycling Process*'. **Dr. (Mrs.) Anagha Vaidya Soocheta**, from University of Mauritius delivered lecture on '*Eco-Design Modular Flat Pack Travel Shoes*'. **Dr. Jerry Tagang**, Nigerian Institute of Leather Science & Technology (NILEST), Nigeria presented a paper titled '*Investigation into Preferred Type of Footwear Out-Sole for People Living with Diabetes*'.

Presentations from **Palestine** and **Sri Lanka** were by **Mr. Asem G Abuomar**, Leather and Footwear Products Development Centre and **Mr. Suresh Aluvihara**, Department of Export Agriculture respectively presented papers on '*Leather and Shoes in Palestine-Leather and Shoe Cluster*' and '*An Advanced Review on the Impact of the Leather Tannery Waste Materials on the Environment and Mitigation Methods*'.

From **Uganda**, a joint paper presentation was by **Mr. Lutalo Richard Bosco**, and **Mr. Geoffery Sempiri**, Uganda National Council for Science and Technology, on '*Uganda's Efforts to Support SMEs in the Leather Sub-sector: The Case of the Technology Innovation and Business Incubation Centre (TIBIC)*'. Another joint presentation was from **Vietnam** by **Mr. Tran Van Vinh** and **Mr. Le Quang Tuan**, Researcher, Vietnam Leather and Shoes Research Institute (LSI) on '*Vietnam's Leather and Footwear Industry: Overview Status Report and Circular Economy Trend*'.



The Concluding Session was chaired by **Dr. Amitava Bandopadhyay** and Co-Chaired by **Dr. P. Thanikaivelan**. Extensive discussions were held during this session on **Chennai Resolution 2023** on '*Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries*' after which the Resolution was unanimously adopted by the participants with recommendations made to the concerned ministries, agencies and other authorities in their countries.

FOREIGN DELEGATE- INDUSTRY MEET

Dr. Jerry Tagang's Meeting with Mr. Elango Devy during the International Training Workshop on "Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries", January 30-31, 2023, held at Chennai, India



On a request from **Dr. Jerry Tagang**, Director, *Nigerian Institute of Leather and Science Technology*, Nigeria, NAM S&T Centre with the help of CSIR-CLRI, Chennai arranged a short meeting between **Dr. Jerry Tagang** and **Mr. Elango Devy**, Director, *Diabetik Foot Care India Pvt. Limited*, Chennai. Diabetik Foot Care India is a certified leading manufacturing company and a distributor of a wide range of diagnostic and therapeutic products for the management of diabetes and related complications.

During the meeting, Mr. Devy highlighted about Electronic Foot Sensor Plate Podiastat, an instrument used for the early recognition of altered pressure patterns in diabetic patients through sensors. With the help of instrumented analysis, the risk zones of foot ulcer can be detected. This instrument is cost-effective, portable and light in weight. Dr. Tagang

showed his interest in the foot sensor plate and took one from Diabetik Foot Care India Pvt. Limited for exploring its utility for people suffering in Nigeria.

Chennai Resolution

on

Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries

WE, THE DELEGATES of the two day International Training Workshop on “Emerging Trends in Materials, Design, Innovation and Intelligent Manufacturing of Footwear and Leather Products in Developing Countries”, organised by the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) in partnership with Central Leather Research Institute, a constituent laboratory under the Council of Scientific and Industrial Research (CSIR-CLRI), Chennai, Indian Leather Technologists Association (ILTA South) and LERIG Trust at CSIR-CLRI, Chennai during 30-31 January 2023;

COMPRISING, practicing footwear and leather product manufacturers, tanners, educationalists, researchers in academic and R&D institutions, industries, NGOs and policy and decision makers in the government agencies and ministry departments of the developing countries from Egypt, India, Indonesia, Mauritius, Myanmar, Nigeria, Palestine, Sri Lanka, Uganda, Vietnam and Zambia;

EXPRESSING GRATITUDE to the organisers and co-sponsors of the International Training Workshop;

CONSIDERING THAT the economic, environmental and social sustainability of the footwear and leather products industry in the developing countries is very much critical to the overall development of the nation as the industry is unique in that it links the rural farmer of the developing countries with the fashion and high-end consumers of developed countries;

DELIBERATING ON the current level of technology implementation in the footwear and leather product sector in various parts of the world, including the emergence of new materials, accessories, designs and various intelligent manufacturing systems developed and practiced, and analyzing the role of industrial policy and the socio-economic factors that affect performance of the industry in the region;

RECOGNISING THAT development of the manufacturing industry including footwear and leather product industry is not just based on how best the economic and social factors are addressed but also the technology, sustainability and other related factors;

COMMITTING TO IDENTIFYING KEY CHALLENGES towards the development of leather product sector in various developing countries; identifying region specific appropriate technologies and setting implementation targets;

UNANIMOUSLY RESOLVE AND RECOMMEND the following

1. The concerned ministries, departments, agencies and industrial entities should develop a comprehensive plan of action for ensuring the development of the footwear and leather product sector through incremental inclusion of new sustainable materials, designs and innovative technologies and executing an all-inclusive human resource development programme;
2. Efforts should be made to develop a Science & Technology network that could identify and take up short-term and long-term country specific R&D projects and also promote international cooperation and transfer of technologies amongst developing countries along with requisite shop-floor training;
3. The developing countries should adopt best practices along the footwear and leather products value chain starting from various materials to used product disposal and set up platforms for coordination among them in a diplomatic manner;
4. There should be an accelerated effort to jointly develop technologies with the comparative advantage of various new materials and manpower of relevant developing countries into a competitive advantage by developing and employing appropriate technologies to transform leather and various new materials to footwear and leather products;
5. The nations with huge internal consumption potential should develop key mechanisms for infusing investments for further value addition and attracting market opportunities;
6. Research and Development cooperation should be encouraged to bring about value addition to footwear and leather products both nationally and internationally thus contributing to job creation, poverty reduction and improving standard of living in the developing countries;
7. Entrepreneurial, technical and marketing skills should be developed to turn the footwear and leather product industry in the developing countries into an economically, environmentally and socially sustainable industry;
8. Industry 4.0 should be adopted with additive manufacturing practices by incorporating efficient use of resources, improved collaboration efficiency, flexibility of work practices and intelligent manufacturing systems;
9. Alternative raw material sources for footwear and leather products that are eco-friendly should be developed towards meeting the goals of climate change forum and environmental norms;
10. Production linked Incentive and economic model for women-led development should be implemented to increase the growth of footwear and leather products industry;
11. Innovative accessories should be explored to meet the ever-growing demands for footwear and leather product industries;
12. Enhance design skills for footwear, leather goods and garments considering the significance of design development in moving-up the value chain with the objective to create new designs for customer driven markets and train local designers;
13. Quality and safety standards should be established and adhered to leverage these to attain competitive advantages;
14. Efforts should be made to develop new materials and products from the wastes generated from the footwear and leather product industries;
15. Financial, technical, policy support, incentive mechanisms, capital at liberal terms, subsidies etc should be provided by the governments in the developing countries to adopt best practices in footwear and leather products; and
16. Research-industry linkage and incubator facilities should be encouraged to facilitate technical consultancy, manpower training for local industry, entrepreneurship development, technology transfer and nurturing new entrepreneurs in footwear and leather products and services in developing countries.

The above recommendations may be submitted to the governments and other relevant stakeholders of the developing countries for their appropriate action.

THUS, RESOLVED AND UNANIMOUSLY ADOPTED ON THIS DAY, THE 31ST OF JANUARY 2023, AT CHENNAI (TAMILNADU), INDIA.

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frameworks and initiatives that could aid not just in containing this crisis but also in repairing some of the damages caused.

The United Nations (UN) has committed to reduce the amount of plastic that is released into the environment through a number of projects which focus on micro plastics, marine litter and single-use plastic pollution. A number of Sustainable Development Goals address the issue of plastics because it aims to conserve and sustainably use marine resources for sustainable development.

In this context, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi, India, in partnership with the JSS Academy of Higher Education and Research (JSS AHER), Mysuru, Karnataka, India and the Scientific Committee on Problems of the Environment (SCOPE), Amstelveen, the Netherlands organized an International Workshop on '**Combating Plastic Pollution in Terrestrial Environment**' during **March 14-15, 2023**. The Workshop was hosted by JSS AHER at Mysuru, India.

The primary objective of this Workshop was to identify the important plastic waste release mechanisms that significantly contaminate the soil, atmosphere and freshwater ecosystems and to share experiences and best practices on effective terrestrial plastic waste management. This Workshop also covered a number of issues including origins, dynamics, dangers and viable remedies for reducing the release of plastic wastes into the terrestrial ecosystem.

The two-day program was organized in different technical sessions to share knowledge and best practices adopted by various NAM and other developing countries to develop synergy, exchange knowledge and ideas on plastic pollution and provide solutions to combat the same with a broader perspective with special focus to the developing countries. The Workshop aimed to bring together experts, policy makers, and city level authorities from municipalities, State Pollution Control Board/Pollution Control Committee, Department of Environment, Department of Urban Development, research and academic organizations from the NAM and other developing countries to combat plastic pollution in terrestrial environment. The Workshop was attended by **150** scientists, researchers, academicians, policymakers and other professionals from **10** countries namely; **Egypt, Indonesia, Malaysia, Mauritius, Myanmar, Nepal, Norway, South Africa, Sri Lanka and the host country India.**

The Inaugural Session was facilitated with an Introduction by **Dr. Vishal Kumar Gupta**, Dean (Academics), JSS AHER, Mysuru and a welcome address by **Dr. B. Manjunatha**, Registrar, JSS AHER, Mysuru. All the guests, invited speakers, keynote speakers and chairpersons, participants and experts from various organizations were welcomed by **Dr. Pallavi N.** on behalf of JSS AHER, Mysuru. **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre, New Delhi welcomed the delegates and briefly discussed the idea behind conducting this Workshop. In his address, he provided an overview about the NAM S&T Centre, describing its organizational structure, objectives and major scientific activities. He highlighted that the world, in particular the blue world, is awash with plastic pollution and also mentioned the consequent harmful effects of micro plastics in the environment.

Dr. Surinder Singh, Vice Chancellor, JSS AHER, Mysuru in his opening remarks, welcomed all the participants and experts. He emphasized that the younger generation, especially the children must be encouraged to say no to plastics. He further stated that this Workshop could provide an opportunity to move towards a cleaner, greener and healthier environment.

Prof. (Dr.) Jon Samseth, President of SCOPE briefly mentioned about the SCOPE and indicated how crucial plastic pollution is in the present scenario.

Prof. (Dr.) B. Suresh, Pro-Chancellor, JSS AHER, Mysuru, in his inaugural address, briefly talked about the importance of this topic and challenges imposed by the excessive and mismanaged use of plastics in the developing countries.

The Chief Guest, **Dr. Shanth A. Thimmaiah**, Chairman, Karnataka State Pollution Control Board, Government of Karnataka, India, in his keynote address, stated that the plastic waste present today will be doubled by 2050 if remained unattended and untreated. He pointed out the various rules in regard to the plastic waste management and emphasized on the fact that micro level of contributions towards plastic waste eradication can make macro level of impacts in preventing plastic pollution.

During the Workshop, the Chief Guest released the Fact File on "**Birth Defects: A Call for Action**" prepared by the JSS Medical College, Mysuru, India in collaboration with the NAM S&T Centre. The Fact File has been conceptualized and edited by **Dr. H. Basavana Gowdappa**, Principal, JSS Medical College, Mysuru, India with inputs from the Scientific Staff of the NAM S&T Centre, New Delhi.

Dr. C. G. Betsurmth, Executive Secretary, JSS Mahavidyapeetha mentioned that although plastic waste management is a complex issue, the problem can be resolved by a mass decision making and its subsequent implementation.

The Workshop was conducted with **6** Technical Sessions under which **5** Keynote Lectures were delivered, **21** paper presentations and few poster presentations were made, all deliberating on the critical issues of plastic pollution and its management.

Five Keynote speakers during the Workshop were **Dr. C. G. Betsurmth**, Executive Secretary, JSS Mahavidyapeetha, India; **Dr. Kandiah Pakeerathan**, University of Jaffna, Sri Lanka; **Prof. Rajagopalan Vasudevan (Padma Shri Awardee)**, Thiagarajar College of Engineering, Madurai, India; **Dr. Neville Sweijd**, Director, Alliance for Collaboration on Climate and Earth systems Science (ACCESS), South Africa and **Prof. Praveen C Ramamurthy**, Indian Institute of Science, Bangalore, India. The respective lectures delivered by them were on '*Plastic Waste Management: Mysore Experiment*'; '*Hazards of Micro Plastic*

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Pollution in Agriculture'; 'Plastic Waste Management: Not to Ban, but Plan'; 'The South African "National Flower"- the Plastic Shopping Bag' and 'Micro Plastic Challenge: Molecular Solid-state Sensors'.

Chairs for respective six Technical sessions were **Prof. (Dr.) Jon Samseth**, President of SCOPE, the Netherlands; **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre, India; **Dr. Kantesh BM** and **Dr. Sumana K**, JSS AHER, India, **Dr. Kandiah Pakeerathan**, University of Jaffna, Sri Lanka; **Prof. (Dr.) Sharmila Jayasena**, University of Colombo, Sri Lanka and **Prof. (Dr.) Ibrahim Abdelmageid Hassan Gadallah**, Alexandria University, Egypt.

From India, 13 presentations were made by: **Dr. Manoj Kumar**, CSIR-National Physical Laboratory, New Delhi, **Dr. Pushpa Tuppad**, JSS Science and Technology University; **Dr. Vadiraj KT**, JSS AHER; **Ms. Aiswriya VP**, Central University of Kerala; **Ms. Kavyaa P. Malimath**, JSS Science and Technology University; **Ms. Anushree S.**, Manipal Institute of Technology; **Mr. Manu Martin Paul**, Manipal Institute of Technology; **Dr. Divya Krishnamoorthi**, Vinayaka Mission's Research Foundation (DU); **Mr. Pruthvi G R**, JSS AHER; **Mr. N. M. Guruprasad**, Kuvempu University; **Dr. Sumana K**, JSS AHER; **Ms. Afrah Kounain P.**, JSS AHER and **Ms. Gayathry S.**, Fatima Mata National College, Kerala. Their respective papers were on '*Current Status and Significance of Ambient Micro Plastics Research in India*'; '*Plastic Waste Reuse as Construction Materials*'; '*Value Addition of Plastic Waste to Waste Plastic Oil for Future Energy Security by Hybrid Pyrolysis*'; '*Evaluation of Ozone Mediated Oxidation Process as a Possible Method of Micro Plastic Degradation*'; '*Tertiary Recycling of Expanded Polystyrene into Value Added Chemicals*'; '*Assessment of Micro plastic Distribution, Abundance and Characteristics from a Tropical Blue Carbon Ecosystem of Southwest India*'; '*Preliminary Insights into Micro plastic Pollution from Mangrove Sediments of Southwest Karnataka*'; '*Recycling and Reusing of Denture base resin acrylic beads (PMMA) used in Dentistry*'; '*A Detailed Study on Occurrence, Sources, Potential Impacts of Micro plastics in Environment and Characterization of Micro plastics by FT-IR Analysis: A Case around KRS-Dam of River Kaveri, Mandya District*'; '*Overview of Plastic Pollution on the Terrestrial Ecosystem of Aghanashini Estuary, Uttara Kannada, India*'; '*Microbial Metagenomic Approaches towards the Effective Biodegradation of Plastics*'; '*Microbial Degradation of Plastic- A Sustainable Approach - Tackle Environmental Threats*' and '*Micro plastic Pollution in the sediments of Ashtamudi Lake, a Ramsar site in Kollam, Kerala*'.

There were eight presentations made by the foreign participants.

From Egypt, a paper titled- '*Hazards of Plastics: A Case Study from Egypt*' was presented by **Prof. (Dr.) Ibrahim Abdelmageid Hassan Gadallah**, Alexandria University. **Dr. Muhammad Reza Cordova**, Indonesian National Research and Innovation Agency, Indonesia presented a paper on '*Spatio-temporal Variation and Seasonal Dynamics of Stranded Beach Anthropogenic Debris on Indonesian Beach from the Results of nationwide Monitoring*'. From Mauritius, a paper titled- '*Country Status on Plastic Pollution*' was presented by **Mr. Vedanand Bhurosah**, Ministry of Education, Tertiary Education, Science and Technology, Phoenix. A paper titled- '*Production of Wood Plastic Composite from Plastic Wastes*' was presented by **Ms. Thida Aung**, Principal Scientist, Ministry of Science and Technology, Myanmar.

Two presentations from Malaysia were by **Dr. Sarva Mangala Praveena**, Universiti Putra Malaysia and **Ms. Najihahmn Binti Mohamad**, Fisheries Research Institute (FRI), Jalan Batu Maung and their respective papers were entitled- '*Exploration of Micro Plastics Pollution Sources in Terrestrial Environment: An Evidence from Malaysia*' and '*Distribution of Micro-plastics in Water, Sediment, and Mussels of Langkawi Island, Malaysia*'.

Mr. Deen Bandhu Parajuli, Nepal Academy of Science and Technology from Nepal presented a paper titled- '*Plastic waste Management: A Challenging Issue for Developing Countries*'. A paper titled- '*Heterogeneous Microbial Biofilms: A Promising Solution for Combating Terrestrial Micro plastic Pollution*' was presented by **Prof. (Dr.) Sharmila Jayasena**, University of Colombo, Sri Lanka.

After all the technical presentations, a **Panel Discussion** was held, chaired by **Prof. (Dr.) Jon Samseth**, President SCOPE and the Panel Members were **Dr. Neville Sweijd** (South Africa); **Prof. (Dr.) Ibrahim Abdelmageid Hassan Gadallah** (Egypt); **Dr. Kandiah Pakeerathan** and **Prof. (Dr.) Sharmila Jayasena** (Sri Lanka); **Dr. Sarva Mangala Praveena** (Malaysia) and **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre, New Delhi. The discussion was moderated by **Dr. S. Suriyanarayanan** (SCOPE India) and **Dr. Shivaraju HP** (JSS AHER, India). Discussions were held where plastic pollution was considered as a complex problem which needs to be attended through various dimensions. Various approaches were discussed to combat the plastic pollution such as through: Biodegradation and incineration. Every process is bound to have some limitations. For an effective technology to get rid of plastic, it needs to be safe, efficient and cost effective. Considering the seriousness of the issue and the problems involved, Dr. Amitava Bandopadhyay suggested setting up of a Centre of Excellence tentatively titled "**JSS AHER-SCOPE-NAM S&T Centre of Excellence**" at JSS AHER, Mysuru on combating Plastic Pollution which could initially be started in virtual mode and later could be extended to a Physical Research and Development Centre.

After a comprehensive deliberation, the **Mysuru Resolution** on '**Combating Plastic Pollution in Terrestrial Environment**' was unanimously adopted by the participants. Several important recommendations were made to the governments, institutions, policymakers, end-users and other key stakeholders.

Mysuru Resolution

On

Combating Plastic Pollution in Terrestrial Environment

We, the participants of the International Workshop on “Combating Plastic Pollution in Terrestrial Environment”, held at Mysuru, India during **14th & 15th March, 2023**;

REPRESENTING the governments, academic and research institutions, and S&T agencies, as well as other relevant stakeholders from Egypt, India, Indonesia, Malaysia, Mauritius, Myanmar, Nepal, South Africa, Sri Lanka and Norway.

RECOGNIZING that Plastic pollution has become one of the most pressing environmental issues in the world that affects terrestrial, aquatic, and marine ecosystems, and that accumulation of plastic waste in the terrestrial environment is a significant threat to wildlife, human health, and ecological balance;

REALIZING that concerted efforts to combat plastic pollution in the terrestrial environment is crucial for the health and sustainability of the planet.

RECALLING the aims of the workshop to bring together experts from NAM and other developing countries in pollution prevention efforts and related ecosystem and services and socio-economic sectors as well as members of planning and policy groups working towards combating terrestrial plastic pollution;

REAFFIRMING the commitment to combat plastic pollution in the terrestrial environment in NAM and other developing countries to ensure that the efforts to address this critical issue should be made with clear and measurable goals, increased funding, participation of stakeholders, innovation, and monitoring of progress;

UNANIMOUSLY RESOLVE AND RECOMMEND the following:

- Policies and strategies should be adopted to reduce Single-Use Plastic Products such as straws, plastic bags, and water bottles and encourage the consumers to switch to reusable alternatives such as reusable water bottles, cloth bags, and metal straws.
- Governments, businesses, Academia, R&D and individuals should contribute to reducing plastic pollution by implementing proper waste management practices including recycling, waste segregation, and disposal of plastic waste in landfills.
- Governments, non-profit organizations, Scholars and schools should organize campaigns to educate the public about the dangers of plastic pollution and the importance of reducing plastic use.
- Businesses should be encouraged to use sustainable packaging and opt for eco-friendly materials such as biodegradable or compostable plastics, paper, and cardboard.
- Governments should impose ban on the production and use of single-use plastic items such as plastic bags, straws, and utensils
- Governments, businesses, and non-profit organizations should invest in research and development to find alternative materials and products that are biodegradable or compostable.
- Regional level development and implementation of a policy framework should be facilitated.
- Governments and all other stakeholders should encourage and support the United Nations (UN) commitment to reduce the amount of plastic that leaks into the environment through a number of projects that focus on micro plastics, marine litter and single- use plastic pollution that can be a catalyst for change across the developing world in regard to “Agenda for Sustainable Development 2030”.
- Combating plastic pollution in the terrestrial environment requires a concerted effort from governments, businesses, NGOs and individuals. Implementing a combination of the above solutions would help reduce plastic pollution and ensure a cleaner environment for future generations.
- Increase pressure on manufactures to oblige to Extended Producer Responsibility (EPR) by responsibly recollect and recycling the produced plastic and e-waste.

That this resolution may be submitted to the Heads of State and Governments of NAM and other Developing Countries and other participating institutions for appropriate actions.

THUS, UNANIMOUSLY RESOLVED AND ADOPTED ON THIS DAY, THE 15TH MARCH, 2023 AT MYSURU (KARNATAKA), INDIA

Special Features

EXPLORING THE FUTURE OF INNOVATION-DRIVEN GROWTH AND THE ROLE OF INTELLECTUAL PROPERTY: U.S. INDUSTRY EXPERIENCES

Two novel innovation waves are heading our way, according to the Global Innovation Index 2022; a Digital Age Wave and a Deep Science Wave. The workshop **“Exploring the Future of Innovation-driven Growth and the Role of Intellectual Property: U.S. Industry Experiences”** - organized by the World Intellectual Property Organization (WIPO) and the Intellectual Property Owners Association (IPO) held on January 18, 2023- considers the role of intellectual property (IP) in these future innovation waves with leading US IP practitioners and experts. It was a great success, with US business leaders expressing optimism about the potential of upcoming innovation waves.

The goal of the workshop was to discuss how intellectual property (IP) can reverse the trend of global productivity declines and how to better translate innovation investments into tangible impacts.

Participation and contribution of the most innovative companies in the world such as 3M Cargill, Dell Technologies, DuPont, Google, Hewlett Packard Enterprise, Thermo Fisher Scientific and Tenneco helped to make the discussions cutting-edge and close to the business frontier.

At the start of the event, Ms. Kathi Vidal, the Director of the United States Patent and Trademark Office (USPTO) underlined how innovation in ICT spaces in areas such as biotechnology, nanotechnology, materials and clean energy production/distribution have the potential to drive productivity and growth over the next decade. Mr. Krish Gupta, Dell Technologies and Marco M. Alemán, World Intellectual Property Organization (WIPO), painted a picture of the two looming Digital Age and Deep Science innovation waves and how IP can contribute by incentivizing large investments and improving knowledge exchange across innovation actors drastically.

A few key takeaways:

- While many economists are pessimistic about the potential to revive productivity growth through innovation (the tech pessimist camp), many of the U.S. business leaders invited were strongly optimistic – a welcome and much needed good news.
- Digital age technologies such as supercomputing, artificial intelligence (AI), and machine learning are on the verge of making significant productivity impacts across all sectors and fostering scientific breakthroughs in all fields. Sectors such as construction, education, health and transport, which are key to societies, but which have suffered much from low productivity growth for the last decades might see the biggest positive productivity impacts.
- While the productivity impacts of the Deep Science wave are harder to measure (e.g. how much do new cancer cures or new vaccines add to productivity?), we are at a tipping point where breakthroughs in bio- and nano-technologies, new materials, and other sciences will finally translate into tangible innovations in the market place.
- Perseverance pays off. The Digital Age and Deep Science innovations are highly interdependent. They also have in common that they were not built overnight. They were decades in the making, and the result of prolonged scientific research and costly innovation investments.
- IP is here to stay with a central role in facilitating the journey from science to the market place, with an evolving role, in particular in how IP enables collaboration across (sometimes competing) firms and across entire industries, and with firms relying on an ever-more complex mix of IP forms, with speakers noting that trade secrets will play an increasingly important role in the future.
- Finally, IP does not pick any winners; as technology-neutral tool, it supports innovation across-the-board; no questions asked.

https://www.wipo.int/global_innovation_index/en/news/2023/news_0003.html, January 25, 2023

https://www.wipo.int/econ_stat/en/economics/news/2023/news_0001.html, January 18, 2023

UN WATER CONFERENCE

Historic UN Conference marks Watershed Moment to Tackle Global Water Crisis and ensure Water-Secure Future

The UN 2023 Water Conference took place from 22-24 March at the United Nations in New York City, has generated more than 700 commitments aimed at driving transformation towards a water-secure world. Some 10,000 participants gathered at UN Headquarters and online from 22 to 24 March 2023, to urgently scale up action to address the water crisis and ensure equitable access to water and sanitation for all.

The Conference brought together world leaders, civil society, business leaders, young people, scientists, academics, the UN System and others from across sectors, agriculture, energy, environment and water around a common goal: to urgently tackle the water crisis and set the world back on track to achieving Sustainable Development Goal 6 – On Clean Water and Sanitation.

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

At the closing ceremony UN Secretary-General António Guterres noted that “The commitments at this Conference will propel humanity towards the water-secure future every person on the planet needs. To achieve this, the Secretary-General highlighted key game-changers: from reinforcing water's place as a fundamental human right and reducing the pressures on the hydrological system, to developing new, alternative food systems to reduce the unsustainable use of water in food production and agriculture and designing and implementing a new global water information system to guide plans and priorities by 2030.

UN 2023 Water Conference – A watershed moment for the SDGs- Conference deliberations ranged from the urgency of the water crisis, including its role in forced migration, climate change and conflicts to stressing its critical link to good health, poverty reduction and food security. Attention was also given to solutions, with deliberations spanning the need for better data collection, enhanced governance systems, capacity development opportunities and funding gaps in the water sector. With financing needs at between US\$182 to more than US\$600 billion annually, the importance of unlocking financing and innovative funding schemes, calling for new innovations and investments at scale in the water economy was also underscored.

Commitments generated at the Conference are now part of the Water Action Agenda.

Transformative Water Action Agenda- The Key Outcomes of the Conference

The Water Action Agenda captured over 700 commitments aimed at driving transformation from a global water crisis to a water-secure world. The agenda represents the global community's bold resolve to address the water challenges through a more coordinated and results-driven approach.

The conference outcomes will also receive concrete follow-up in three key upcoming Summits: the SDG Summit during the UN General Assembly in September 2023, the Summit of the Future in 2024, the World Social Summit in 2025, and through the annual High- level political forum on sustainable development, Conference of Parties and other United Nations processes, as well as the Dushanbe Water Process.

❖ **Snapshot of Commitments**

➤ **Member States**

- The US announced a commitment of up to \$49 billion in investments to support climate-resilient water and sanitation infrastructure and services.
- Japan will proactively contribute to the solution of water-related social issues faced by the Asia-Pacific region by developing “quality Infrastructure”, providing financial assistance worth approximately 500 billion yen (\$3.65 billion) over the next five years.
- Vietnam pledged to develop policies for major river basins management by 2025 and to ensure all households would have access to clean running water by 2030.
- Switzerland submitted 5 commitments to contribute to the UN's work, including in the areas of the Water Convention and transboundary cooperation. Switzerland is the co-chair of the Interactive Dialogue on Water for Cooperation.
- The Niger Basin Authority (NBA) and the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) made a joint commitment of \$21.2 million in funding for a project that strengthens the Niger Basin Authority (NBA) and its member countries.
- The Government of Mozambique committed to taking all necessary steps to accelerate achievement of the UN Sustainable Development Goal (SDG) 6 by 2030 with investments of \$9.5 billion.
- With the Continental Africa Investment Programme (AIP), the African Union Commission aims to close Africa's water investments gap by mobilising at least US\$30 billion/year by 2030 through a range of initiatives, including the International High-Level Panel on Water Investments for Africa.
- By 2030, the EU aims to support the access of 70 million individuals to an improved drinking water source and/or sanitation facility. The EU will also support Member States with €20 million funding to accelerate the deployment of wastewater surveillance for COVID-19.
- More than 50 leading global companies unite to make collective commitment to SDG 6.

➤ **Multilateral Banks**

- The Asian Development Bank commits to investing \$11 billion dollars in the water sector in the Asia-Pacific Region and \$100 billion to the water sector globally by 2030.

➤ **Private Sector**

- Starbucks, Ecolab, Gap Inc., Reckitt and DuPont joined forces with U.S. Government to invest nearly \$140 million

(Contd. from Page 9 - Special Features.....)

in Water Access Fund with the goal of reaching 5 million people with access to water, sanitation and hygiene.

- DANONE is launching a water acceleration blending fund to give daily safe water access to 30 million people in need.
- Xylem and 16 other companies commit \$11 billion dollars in Research and Development.
- World Benchmarking Alliance has pledged to assess 1,000 global companies across 22 industries on their impact towards achieving water-related goals every two years to help close the corporate accountability gap.

➤ **NGOs**

- World Vision committed to raising and investing \$2 billion by 2030 to extend the impact of transformative water, sanitation, and hygiene (WASH) services work across 50 countries in six regions.

<https://www.un.org/sustainabledevelopment/blog/2023/03>

<https://www.unwater.org/news/historic-un-2023>

Memorandum of Understanding (MoU) signed between the Scientific Committee on Problems of the Environment (SCOPE), Amstelveen, the Netherlands and the NAM S&T Centre, New Delhi, India



A **Memorandum of Understanding (MoU)** was signed between the **Scientific Committee on Problems of the Environment (SCOPE)**, Amstelveen, the Netherlands and the **Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre)**, an Inter-governmental Organization based at New Delhi, India on **March 13, 2023**. The MoU was signed in order to re-establish and expand their collaborative relationship on the basis of previously built contacts and mutual understanding.

Recognizing the common interest and importance of strengthening the partnership between the NAM S&T Centre and SCOPE with the purpose of scientific and technological collaboration, joint publication, exchange of expertise, and dissemination of S&T knowledge and information, the MoU was signed by **Dr. Jon Samseth**, President, SCOPE and **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre in the presence of **Dr. Neville Sweijd**, Vice President, SCOPE (virtually) and **Dr. S. Suriyanarayanan**, Head (SCOPE India Office) at the JSS Academy of Higher Education and Research (JSSAHER), Mysuru, India.



The objective of the MoU is to establish the basis for an organizational arrangement in order to encourage involvement in the broad fields of academic, science and technology, predominantly to take-up joint scientific activities including organization of International Workshops and Training Workshops/Programmes in the areas of common interest and bringing out scientific publications from time to time through mutual assistance and co-operation.



SCIENCE, TECHNOLOGY AND INNOVATION DIPLOMACY IN DEVELOPING COUNTRIES

PERCEPTIONS AND PRACTICE

In the age of global knowledge economy, Science, Technology & Innovation Diplomacy has become an important mechanism for South-South and North-South relations in pursuit of scientific collaboration, co-generation of knowledge and usage of innovative technology for socio- economic benefits. STI Diplomacy plays a critical role as an enabler and driver of knowledge and technology for economic development across the borders.

The NAM S&T Centre has published a book titled “**Science, Technology & Innovation Diplomacy in Developing Countries: Perceptions and Practice**” edited by Prof. Venugopalan Ittekkot (Germany) and Ms. Jasmeet Kaur (India). The book contains 23 Chapters contributed by experts from both the developing and developed countries, compiles existing knowledge on the subject and covers the highlights of both South-South and North-South Cooperation.

The book would be a useful reference material for scientists, technologists, young researchers, diplomats, government officials, policymakers, and other stakeholders who are actively engaged directly or indirectly in STI Diplomacy and associated activities.

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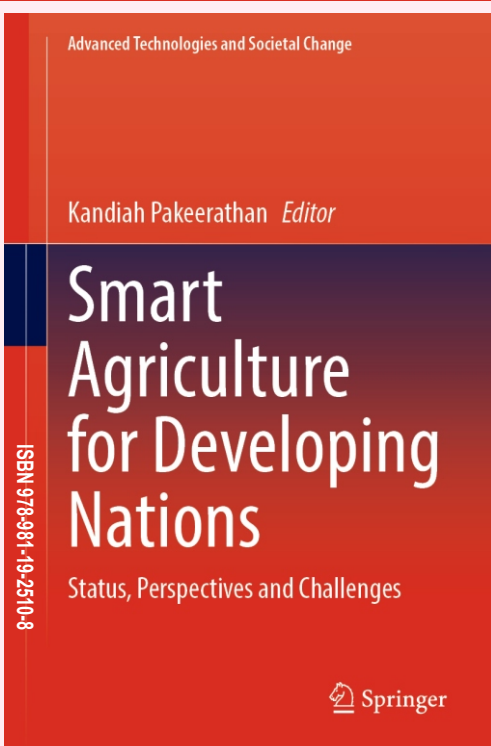
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SMART AGRICULTURE FOR DEVELOPING NATIONS

STATUS, PERSPECTIVES AND CHALLENGES

The concept of "Smart Agriculture" implies to improve the farming practices for efficient use of available resources, eliminate the risk of losing yields, optimize the control over production, better cost management, waste reduction and eliminate hunger. Agricultural R&D and smart technological innovations to enhance agricultural productivity and capacity are significant for developing countries, particularly for the Least Developed Countries (LDCs).

The NAM S&T Centre has published a book titled "Smart Agriculture for Developing Nations: Status, Perspectives and Challenges" edited by Dr. Kandiah Pakeerathan (Sri Lanka). The book in its 18 chapters brings together scientific communities from India, Indonesia, Iraq, Malaysia, Mauritius, Myanmar, Palestine, Sri Lanka and South Africa to share their expertise to make the farming system more connected and intelligent, to reduce the overall cost and improve the quality and quantity of food production and also help to maintain the food supply chain sustainability.

This book would be a useful reference material for students, scientists, technology providers, policymakers and many others who are actively engaged in the area of smart agriculture.

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Science, Technology & Innovation News

ARTIFICIAL INTELLIGENCE

Researchers use Artificial Intelligence to Personalise Cancer Patient Treatments

University of Sussex develops a novel method of identifying the genes that are critical to a cancer cell's survival using AI. Research could guide oncologists to personalise cancer patient treatments. Sussex researchers have done this by developing a prediction algorithm that works out which genes is essential analysing the genetic changes in the tumour. This can be used to identify actionable targets that in time could guide oncologists to personalise cancer patient treatments

Dr Frances Pearl, Senior Lecturer in Bioinformatics in the School of Life Sciences at the University of Sussex says “Our vision is to take advantage of the decreasing cost of DNA sequencing and to harness the power of AI to understand cancer cell differences and what they mean for the individual patient's treatment. Through our research, we were able to identify cell-specific gene dependencies using only the DNA sequence and RNA levels in that cell, which are easily and cheaply obtainable from tumour biopsy samples.

By using this new technology to target protein products of tumour-specific dependent genes, cancer cells can be killed, leaving the normal cells which are not dependent on these genes relatively unharmed. Although dependencies can be determined using intensive laboratory techniques, it is costly and time consuming and would not be feasible to analyse all tumour samples in this way.

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

ENERGY & GREEN TECHNOLOGY

Biogas produced with Waste from Apple Juice Production can minimize use of Fossil Fuels in Industry

Scientists at the State University of Campinas (UNICAMP) and the Federal University of the ABC (UFABC) in São Paulo state, Brazil, have successfully produced biogas from apple pomace, the pulpy residue remaining after the fruit has been crushed to extract its juice.

(Contd. from Page 13 - STI News)

An article describing the research is published in the journal *Biomass Conversion and Biorefinery*. The key concept is that of the circular economy, a system of closed loops designed to reduce costs, recover resources from waste, promote reuse and recycling, and maximize use of bioenergy and biomaterials. Apples are among the most widely consumed fruits worldwide, both fresh and processed as juice, vinegar and cider, among other products. The apple processing industry throws away much of the fruit as waste.

"Biorefining with dry anaerobic digestion produces electricity and thermal energy, reduces greenhouse gas emissions, and valorizes waste via conversion to organic fertilizer," said Tânia Forster Carneiro, one of the author of the article. Anaerobic digestion, she explained, is a microbiological process involving consumption of nutrients and production of methane. Dry anaerobic digestion, with total solids in the reactor exceeding 15%, is considered an efficient method of recycling solid organic waste and far more environmentally appropriate than landfill disposal.

The results pointed to a yield of 36.61 liters of methane per kilogram (kg) of removed solids, potentially generating 1.92 kilowatt hours (kWh) of electricity and 8.63 megajoules (MJ) of heat per ton of apple pomace. The bioenergy thus recovered could supply 19.18% of the electricity and 11.15% of the heat used to operate the anaerobic biorefining reactor designed by the researchers, who conclude that biofuels and bioelectricity can contribute to public policy, reduce fossil fuel consumption and cut the greenhouse gas emissions from organic residues.

The research group found the greenhouse gas emissions avoided by the biogas corresponded to 0.14 kg of carbon dioxide equivalent (CO₂e) in the electricity and 0.48 kg of CO₂e in the heat generated per ton of apple pomace. "Anaerobic digestion is a stable technology and can be implemented in small to medium plants, assisting the circular economy transition and offering an added-value alternative to disposal of fruit residues as waste that benefits the entire supply chain," Carneiro said.

Source: <https://techxplore.com/news>, February 9, 2023

ENVIRONMENT

New Land Creation on Waterfronts is Increasing –A Study

Humans are artificially expanding cities' coastlines by extending industrial ports and creating luxury residential waterfronts. The study reports the first global assessment of coastal land reclamation, which is the process of building new land or filling in coastal water bodies, including wetlands, to expand a coastline. The researchers used satellite imagery to analyze land changes in 135 cities with populations of at least 1 million, 106 of which have done some coastline expansion. The study was published in the journal *Earth's Future*.

The study found China, Indonesia and the United Arab Emirates added the most land area, with port extension being the most common reason for development. Shanghai alone has added about 350 square kilometers (135 square miles) of land. In the United States, by comparison, only Los Angeles has noticeably added land area in the last 20 years, with 0.29 square kilometers (0.1 square miles) built.

About 70% of coastal land expansion has been carried out in low-lying regions that are likely to be exposed to extreme sea level rise by the end of the century. Both environmental impacts and projected coastal inundation suggest these developed coastlines are not sustainable, but cities will likely continue to build them, the authors said.

"The ecological impacts of reclamation are immense. Reclamation is a massive civil engineering project that fundamentally alters the characteristics of the space that it targets," Sengupta and his co-authors said. Coastal wetlands are particularly hard-hit. "In the Yellow Sea, for example, more than half of tidal flats were lost mainly due to reclamation."

Other environmental impacts include adding sources of point-source pollution, changing the patterns of sediment movement and altering the biosphere, all of which can impact ocean-based economies such as fishing and tourism. And unequal access to newly created shoreline can exacerbate class divides.

Reclamation also impacts distant ecosystems where fill materials such as sand and gravel are quarried. With a global shortage of sand, Sengupta noted, construction companies are quarrying sand and clay from the seabed, which destroys benthic ecosystems.

Source: <https://phys.org/news>, February 9, 2023

Rare Earth Elements could be Pulled from Coal Waste

Coal mining can pollute nearby waterways, creating acidic water rich in heavy metals. The pollution left behind by abandoned mines is an untapped source of rare earth elements. In Appalachia's coal country, researchers envision turning toxic waste into treasure. They are looking to tap such acid mine drainage (like that shown in western Pennsylvania) for rare earth elements. Rare earths are a valuable set of 17 elements needed to make everything from smartphones and electric vehicles to fluorescent bulbs and lasers.

Pulling rare earths from coal waste offers a two-for-one deal: By retrieving the metals, you also help clean up the pollution. Recovering rare earths from what's called acid mine drainage won't single-handedly satisfy rising demand for the metals, acknowledges Paul Ziemkiewicz, Director of the West Virginia Water Research Institute in Morgantown. But he points to several benefits. Unlike ore dug from typical rare earth mines, the drainage is rich with the most-needed rare earth elements. Plus, extraction from acid mine drainage also doesn't generate the radioactive waste that's typically a by-product of rare earth mines, which often contain uranium and thorium alongside the rare earths. And from a practical standpoint, existing facilities to treat acid mine drainage could be used to collect the rare earths for processing. "Theoretically, you could start producing tomorrow," Ziemkiewicz says. Currently, a pilot project in West Virginia is taking material recovered from an acid mine drainage treatment site and extracting and concentrating the rare earths.

If such a scheme proves feasible, Ziemkiewicz envisions a future in which cleanup sites send their rare earth hauls to a central facility to be processed, and the elements separated.

Source: <https://www.sciencenews.org>, January 20, 2023

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NANOTECHNOLOGY

Scientists Develop New Device to Detect Brain Tumors using Urine

Researchers at Nagoya University in Japan have used a new device to identify a key membrane protein in urine that indicates whether the patient has a brain tumor. Their protein could be used to detect brain cancer, avoiding the need for invasive tests, and increasing the

Scientists Develop New Device to Detect Brain Tumors using Urine

Researchers at Nagoya University in Japan have used a new device to identify a key membrane protein in urine that indicates whether the patient has a brain tumor. Their protein could be used to detect brain cancer, avoiding the need for invasive tests, and increasing the likelihood of tumors being detected early enough for surgery. This research could also have potential implications for detecting other types of cancer. The research was published in *ACS Nano*.

Although early detection of many types of cancer has contributed to the recent increases in cancer survival rates, the survival rate for brain tumors has remained almost unchanged for over 20 years. One possible sign that a person has a brain tumor is the presence of tumor-related extracellular vesicles (EVs) in their urine. EVs are nano-sized vesicles involved in a variety of functions, including cell-to-cell communication. Because those found in brain cancer patients have specific types of RNA and membrane proteins, they could be used to detect the presence of cancer and its progression.

Although they are excreted far from the brain, many EVs from cancer cells exist stably and are excreted in the urine without breaking down. Urine testing has many advantages, explains Associate Professor Takao Yasui of Nagoya University Graduate School of Engineering. He said "Urine tests are an effective, simple, and non-invasive method because the urine contains many informative biomolecules that can be traced back to identify the disease."

A research group led by Yasui and Professor Yoshinobu Baba of Nagoya University's Graduate School of Engineering, in collaboration with Nagoya University's Institute of Innovation for Future Society and the University of Tokyo, has developed a new analysis platform for brain tumor EVs using nanowires at the bottom of a well plate. Using this device, they identified two specific types of EV membrane proteins, known as CD31/CD63, from urine samples of brain tumor patients. Looking for these tell-tale proteins could enable doctors to identify tumor patients before they develop symptoms.

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

AGRICULTURE

Martian Soil may have all the Nutrients Rice Needs

Experiments suggest that the soils of Mars might have the right nutrients for growing rice plants but the plant is going to need some tweaking to survive a toxic chemical there

Martian dirt may have all the necessary nutrients for growing rice, one of humankind's most important foods, planetary scientist Abhilash Ramachandran, of the University of Arkansas in Fayetteville, reported March 13 at the Lunar and Planetary Science Conference. However, the plant may need a bit of help to survive amid perchlorate, a chemical that can be toxic to plants and has been detected on Mars' surface.

Ramachandran and his colleagues grew rice plants in a Martian soil simulant made of Mojave Desert basalt. They also grew rice in pure potting mix as well as several mixtures of the potting mix and soil simulant. All pots were watered once or twice a day. The researchers also tried growing rice in soil with added perchlorate. They sourced one wild rice variety and two cultivars with a genetic mutation modified for resilience against environmental stressors like drought and grew them in Mars-like dirt with and without perchlorate.

The findings suggest that by tinkering with the successful mutant's modified gene, *SnRK1a*, humans might eventually be able to develop a rice cultivar suitable for Mars.

Source: <https://www.sciencenews.org>, March 17, 2023

HEALTH R&D

Scientists Regenerate Diseased Kidney Cells

In a world first, scientists at Duke-NUS Medical School, the National Heart Center Singapore (NHCS) and colleagues in Germany have shown that regenerative therapy to restore impaired kidney function may soon be a possibility. In a preclinical study reported in *Nature Communications*, the team found that blocking a damaging and scar-regulating protein called interleukin-11 (IL-11) enables damaged kidney cells to regenerate, restoring impaired kidney function due to disease and acute injuries.

"Kidney failure is a global epidemic," said Assistant Professor Anissa Widjaja, a molecular biologist with Duke-NUS' Cardiovascular & Metabolic Disorders (CVMD) Signature Research Program. Searching for ways to restore the kidney's ability to regenerate damaged cells, Widjaja, worked with Professor Stuart Cook, Tanoto Foundation Professor of Cardiovascular Medicine at the SingHealth Duke-NUS Academic Medical Center, NHCS, and Duke-NUS Dean Professor Thomas Coffman, a world-leading nephrologist. They teamed up with scientists in Germany to investigate the role of IL-11, which is known to trigger scarring in other organs, including the liver, lungs and heart, in acute and chronic kidney disease. Researchers have found that renal tubular cells, which line the tiny tubes inside kidneys, release interleukin-11 (IL-11), a scar-regulating protein, in response to kidney damage. This leads to increased expression of a gene that arrests cellular growth and promotes kidney dysfunction. In a preclinical model of human diabetic kidney disease, the scientists showed that turning off this process by administering an antibody that binds to IL-11 led to proliferation of the kidney tubule cells and reversal of fibrosis and inflammation, enabling damaged kidney cells to regenerate and restoring impaired kidney function.

"By boosting the kidney's intrinsic capability to regenerate, have shown that we can restore function to a damaged kidney," said Coffman, who is also the principal investigator of the Diabetes Study in Nephropathy. "This discovery could be a real game-changer in the treatment of chronic kidney disease."

Source: <https://medicalxpress.com>, February 2, 2023

Centre Announces

International Training Programme on STI POLICY MAKING FOR SOCIO-ECONOMIC DEVELOPMENT IN THE GLOBAL SOUTH-2023

Kuala Lumpur (Malaysia)
6-8 June 2023

The crucial roles of STI and Policy in socio-economic growth are well demonstrated by the success stories of developed nations. Over the past few decades, the countries in the Global South have realized the importance of Science, Technology & Innovation (STI) as a key issue in their policymaking agenda in order to catalyze their socio-economic development. STI policy of developing countries should particularly emphasize on human resources development and institutional capacity building for education and training, and research & development; creation of a strong STI driven entrepreneurial ecosystem; and promoting international partnerships including South-South Cooperation and STI diplomacy. A policy must be reflective of local technological capabilities, economic resources, cultures, and contexts in overcoming the domestic problems of a nation. In all, a policy must be meaningful, do-able, achievable and sustainable.

Policy design, formulation and development are several of the many crucial components of policymaking process. Policy experts have warned that such process is never linear, sequential and the entire process is in no way automatic. The process may vary from countries to countries and the countries in the Global South face significantly large gaps in the empirical and conceptual knowledge existing in regard to possible broadening of the scope of STI policies. Many developing countries do not have STI Policies and those that have such policies face difficulties in the implementing the same. Therefore, it is vital for any developing country to have a strategically designed Science, Technology and Innovation Policy and its implementation management commensurate with the challenges of the globalizing society.

In this context, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi, India, in partnership with the International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) under the Auspices of UNESCO, Kuala Lumpur is organizing an International Training Programme on “STI Policy Making for Socio-economic Development in the Global South-2023” during 6-8 June, 2023 in Kuala Lumpur, Malaysia.

The Training Programme will be organized and hosted by ISTIC at Kuala Lumpur, Malaysia.

Experts and scientists desirous of participating in the Training Programme, except those from Malaysia, are required to submit their applications directly to the NAM S&T Centre at email: namstcentre@gmail.com as early as possible, but latest by **May 15, 2023**.

Applicants from Malaysia should, however, submit their requests to ISTIC, Malaysia.

More details about the Training Programme are available at Centre's Official Website: www.namstct.org.

FACT FILE

BIRTH DEFECTS: A CALL FOR ACTION



Birth Defects, also known as congenital anomalies, are defined as inborn errors of development caused by multiple factors that disrupt normal embryo-foetal development, especially during gestation. The prevalence of congenital anomalies in developing countries is similar to that observed in many developed countries. However, the health impacts of Birth Defects is higher in developing countries due to lack of adequate diagnostic and treatment facilities, and exposure to infections, diseases, poverty, and nutritional deficiencies, which may elevate the risks of developing birth defects.

A number of methods for the prevention of congenital anomalies have been developed and are being used successfully worldwide. However, there is an urgent need for low and middle-income countries to access such protocols and expand their R&D programs for improved screening of genetic disorders.

Considering the importance of the topic of socio-economic relevance, the NAM S&T Centre has published its second Fact File titled “Birth Defects: A Call for Action”. The Fact File has been jointly prepared by the JSS Medical College, Mysuru, India in collaboration with the NAM S&T Centre. The publication has been conceptualized and edited by Dr. H. Basavana Gowdappa, Principal, JSS Medical

College, Mysuru. The document provides a comprehensive overview about birth defects; impact of birth defects; types of birth defects and causes; relevance of genetic surveillance of birth defects and capacity building for surveillance in developing countries.

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