

NAM

S&T Newsletter



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

VOL. 31, No. 4
JANUARY - MARCH 2022

FROM THE DG'S DESK

Heartiest Greetings to our Esteemed Readers!!



I take pride in sharing that the NAM S&T Centre, in spite of COVID-pandemic restrictions around the world, completed second year successfully without making any compromise in the performance and enthusiasm on the S&T activity front. We acknowledge with gratitude the cooperation and encouragement of our Focal Points and the scientific community in our Member Countries as well as other developing countries in meeting our goals.

I am pleased to mention that the JSS Academy of Higher Education & Research (JSS AHER), Mysuru, Karnataka, India (www.jssuni.edu.in) has become an esteemed Member of the "S&T - Industry Network" of the NAM S&T Centre w.e.f. April 1, 2022 and the Centre warmly welcomes its new Member.

I am happy to inform you that the NAM S&T Centre in the last quarter has organised two important International Programmes virtually: (i) an International Training Workshop on 'Industry 4.0 and Energy Management' during January 19-20, 2022, jointly with the Society of Energy Engineers and Managers (SEEM), India and (ii) International Workshop on 'Gender Issues in Water Management in Developing Countries and Sustainable Development', during 22-23 February, 2022, 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. The popularity of the scientific events organized by the Centre is evident from the response of scientists, researchers, academicians, policy makers and other professionals in the organized programmes. In the first event there were 332 participants from 11 countries and in the second workshop 554 experts and professionals from 15 countries shared their views and experiences on Water and Gender related concerns.

I am also delighted to inform our Member Countries and other stakeholders that as a result of perseverance and efforts of the Centre, the second scientific Monograph entitled **Climate Change Adaptations in Dryland Agriculture in Semi-arid Areas** has been published and released by Springer Nature, Singapore. This book comprising 26 chapters highlights the approaches for achieving trans-disciplinary research integration for "Semi-arid Dryland Agriculture Systems" under changing climates, while also identifying the elements of a collaborative research agenda that are needed to improve global food security.

As a part of our regular S&T activity, the Centre has announced three more scientific events in the next quarter through online platforms - an International Training Workshop on 'Use of Analytical and Modeling Tools Tailored to Country Needs' during April 6-7, 2022, jointly with the Academy of Scientific Research and Technology (ASRT), Cairo, Egypt; an International Workshop on 'Development of Food Green Cities for Urban Sustainability' during April 26-27, 2022, in partnership with the Nepal Academy of Science and Technology (NAST), Lalitpur, Nepal and in another International Workshop on "Role of Science, Technology and Innovation (STI) in Achieving Sustainable Development Goals - 2030" in collaboration with the Indian Ocean Rim Association (IORA), Mauritius.

I would like to take this opportunity to thank all our readers and stakeholders for being a part of our long and eventful journey so far.

Happy Reading!!

Amitava Bandopadhyay
(Amitava Bandopadhyay)
Director General

Centre Organised

International Workshop on
INDUSTRY 4.0 AND ENERGY MANAGEMENT
19-20 January 2022
(Virtual Mode)

The global manufacturing sector has witnessed various industrial revolutions. Currently in the fourth industrial revolution phase, high technological production strategies blended with the intelligent decision support system, take the sector to new heights of productivity.

The principle of Industry 4.0, unlike the traditionally hierarchical and centralized manufacturing system, exhibits a decentralized architecture in which autonomous industrial components connect with one another. These autonomous components interact among themselves with a connected Decision Support System (DSS) to self-diagnose and self-respond in the overall manufacturing scenario. The technologies that are incorporated for the decision-making are the Internet of Things (IoT), Cloud Computing and Big Data. The overall framework of these technologies is connected under a common platform called Cyber Physical System (CPS). In the near future, inequalities between the economic

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International Workshop on
**GENDER ISSUES IN WATER MANAGEMENT IN
DEVELOPING COUNTRIES AND SUSTAINABLE DEVELOPMENT**
22-23 February 2022
(Virtual Mode)

Billions of people in rural and urban communities around the world have difficulty in accessing clean and safe water resources. Water has strong gender dimensions both in accessing clean water and water utilization in various household, agricultural and industrial sectors. According to UN-Water, in many countries, the presence or absence of safe and sufficient water supply and improved sanitation facilities has a disproportionate effect on the lives of women and girls.



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developments of industrialized; emerging economies and developing countries could further deepen, if all countries cannot tap into digital development benefits.

Energy availability, reliability and manageability are essential ingredients of energy-critical buildings and manufacturing processes in the scope of Industry 4.0. Industry 4.0 requires innovative technological solutions capable of limiting energy waste and providing real-time control over consumption. In short, without energy management, there is no Industry 4.0.

To keep abreast of the growing significance of Industry 4.0, to deliberate upon the role of energy management in Industry 4.0, and to impart skills and knowledge on the principles and practices of energy management for emerging manufacturing processes and premises in future, the **Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre)** jointly with the **Society of Energy Engineers and Managers (SEEM), India** organized a two days **International Training Workshop on 'Industry 4.0 and Energy Management'** during **January 19-20, 2022** in Virtual Mode.

The International Training Workshop was organized over 2 days period to provide basic knowledge on the subject through interactive lectures about various aspects of Industry 4.0 framework and explore the disruptive management practices of Industry 4.0 with various opportunities and challenges of the energy management in the Industry 4.0 era

The Training Workshop was attended by **332** scientists, researchers, academicians, policy makers and other professionals from **11** countries namely; **Egypt (2), Iraq (2), Mauritius (4), Myanmar (6), Nepal (9), Nigeria (1), Pakistan (3), Palestine (1), USA (4), Vietnam (1)** and 299 participants from the host country **India**.

The **Inaugural Session** of the training workshop was initiated with welcome remarks by **Ms. Priyanka Warnekar, Prof. Dr. Mohan Khedkar**, Professor, VNIT, Nagpur, India; and **Dr. Vivek Nanoti**, Director, Priyadarshni Group of Institutions, India, co-chaired the Inaugural Session. **Prof. Dr. Khedkar** welcomed all the participants and the experts from the NAM and other foreign countries. **Mr. Jayakumar R Nair**, Vice President, SEEM, India in his speech mentioned the importance of this topic in today's world. He said that Industry 4.0 goes beyond its symbolism and demand. It is very much required not only to optimize our resources in a better way but it is also a vehicle for growth especially for the developing countries which need to focus on using this technology and reduce their emission levels. **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre, India in his address, welcomed the delegates and briefly discussed the idea behind conducting this Workshop. The Chief Guest, **Mr. Abhay Bakre**, Director General, Bureau of Energy Efficiency, Government of India, in his address briefly talked about the Energy Policies, Energy Management, Energy Efficiency, and various steps taken by the government to improve this sector. He also mentioned about G20 which works to address major issues related to global economic growth such as climate change mitigation, job creation, and sustainable development, and explained how India can demonstrate leadership in this area.

The overall programme of the workshop was conducted in four technical sessions respectively chaired by **Dr. Sunil Kumar Sharma** and Co-chaired by **Prof. Dr. Indraj Singh; Mr. Arijit Sen Gupta**, and co-chaired by **Dr. Anil Onkar; Dr. C S Azad** and Co-chaired by **Prof. Dr. K B Porate**; and **Dr. R Hari Kumar** and co-chaired by **Dr. R K Yadav**.

The technical programme of the workshop commenced with the **Keynote Address** delivered by **Dr. Rajat Agrawal**, Professor, Indian Institute of Technology (IIT), Roorkee, India. Discussing the evolution of Industry 4.0 with the 9 pillars, he talked about some of the key features of Industry 4.0 and explained that Industry 4.0 aims at the construction of an open, smart manufacturing platform for industrial-networked information applications, and can be seen as a combination of various technologies which have evolved over time and are now being used in synergy and deciding the future of production. He also discussed India's present status on manufacturing. Two other keynote addresses during the workshop were by **Prof. Dr. Anil Kumar**, Head, Centre of Energy and Environment, Delhi Technological University, India and **Mr. S. P. Garnaik**, Energy Efficiency Services Ltd., India. Prof. Anil Kumar talked about what exactly is the fourth revolution, and how it has evolved itself through ages. He mentioned about some key objectives of Industry 4.0 and challenges faced in Industry 4.0. He also explained in brief about different technologies that have their own benefits and roles to play in Sustainable Manufacturing and the Digitalization of the Energy Sector by using one of the digital approaches related to distributed energy generation known as Virtual Power Plants (VPP). He pointed out that a more conscious approach to creating synergies between Industry 4.0 and sustainable energy could generate more benefits. **Mr. S. P. Garnaik**, briefly talked about the energy efficiency status and energy potential of India, energy-saving opportunities that should be taken into account, and the energy efficiency market in India. He emphasized on "De-carbonization Strategy" with the use of Bio-energy, Electrification, Carbon Capture and Storage, and the need for an integrated approach with the right working environment, efficient operation, and quality output. He further talked about the programmatic approach; and commitments for Action in COP26 – mitigation, adaption, collaboration, and finance.

During the workshop there were four **Plenary Lectures during Technical Session 1**: **Mr. Deepak Chandran**, President, IRIS Energy, USA presented on '**Industrial Internet of Things (IIoT)**'; **Mr. Prasanna Deshpande**, Vice President, ABB India Ltd., India delivered lecture on '**Reactive to Proactive Maintenance through IoT**'; **Dr. Vivek Nanoti**, Director, Priyadarshni Group of Institutions, India, presented on '**Effective Implementation of Education 4.0 for Making Students Ready for Industry 4.0**' and the fourth plenary presentation was on, '**Cyber Security and Block Chain for Industry 4.0**' delivered by **Mr. Raj A. Kapoor**, CEO, India Block Chain Alliance.

The three scientific presentations made by Indian participants in Technical session 2 were on: '**Regulatory Changes Driving the Sustainable Energy**' by **Dr. Debajit Palit**, Director, The Energy Research Institute (TERI), India; '**Sustainable Energy Technology and Products**' by **Mr. Dipen Parikh**, Grundfos Pumps, India; '**Global Warming and Climate Change**' by **Mr. Prem Prakash Barnwal**, Head Technical and Services, CONSERGY, India. Three presentations in Technical Session 3 were: '**Blockchain in Energy Management: A Review**' delivered by **Dr. Subhra Das**; Professor and HoD - Solar Department, Amity University, Haryana, India; and '**Energy Efficient Reverse Osmosis Process Development by Membrane Modifications and Waste Heat Utilization**' by **Dr. Hiren D. Raval**, CSIR-Central Salt and Marine Chemicals Research Institute (CSMCRI), Gujarat, India; and '**Industry 4.0 - New Working Methods and Business Models**' by **Mr. Vinod**

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Vazhapulli, Managing Director, Skanem, India. Another two papers by Indian Scientists were presented in Technical session 4 : '**Driving Energy Efficiency through the Industry 4.0 Approach**' by **Mr. U. V. Krishna Mohan Rao**, International Expert: Energy, and Immediate Past President, SEEM, India, and '**Technologies for Energy Management for Industry 4.0**' by **Mr. Ashwin Krishna**, Managing Director, Promethean Energy Pvt. Ltd, India.

The other scientific papers presented during the Technical Session 3 were on '**Mauritius Stepping on the Trajectory for its Industry 4.0 Revolution**' by **Mr. Hemraj Ramsurrun**, Manager/Curator, Rajiv Gandhi Science Centre Trust Fund, Mauritius; '**Energy Mapping and Management: Critical Steps for Optimal Utilization of Renewable Energy Sources in Nigeria**' by **Mrs. Fausta Ogbuefi Chima**, Head – Energy and Fuel Materials Development, Raw Material Research & Development Council, Nigeria; on '**Implementing a Climate Services Information System (CSIS) in Mauritius - How will it benefit the Energy Sector**' by **Mr. Krisna Bucha**, Senior Meteorologist, Mauritius Meteorological Services, Mauritius and fourth paper on '**Multilayer Spectrally Selective Thin Films with Remarkable Optical Selectivity for High Temperature Concentrated Solar Power Applications**' by **Dr. Atasi Dan**, Foreign Guest Researcher, National Institute of Standards & Technology, USA.

For the Panel Discussion on '**Industry 4.0 to Net Zero**', **Mr. Manish Chakravarty**, Technology Leader, USA was the moderator and **Mr. Azeemuddin**, Society of Energy Engineers and Managers, India was the Co-moderator. Various Panelists put forward their views on different aspects, technologies, transformation and the future of the Fourth Industrial Revolution. The short discussion on Industry 5.0 led the participants to think further on the steps that could be taken to move forward with the world. The Panelists further discussed the re-skill/up-skill required in the educational sector, and a few other steps that must be taken to meet the needs of future technologies.

The **Concluding Session** was chaired and co-chaired by **Dr. Amitava Bandopadhyay** and **Prof. Dr. Mohan Khedkar**, respectively. The Chief Guest of the Concluding Session, **Dr. Ajay Mathur**, Director General, International Solar Alliance, India expressed his deep interest in the topic. He emphasized the importance to reduce Carbon emissions and how the technologies of the fourth industrial revolution can play a major role in it. Dr. Bandopadhyay in his closing remarks thanked everyone who participated in the workshop.

Subsequently, discussion on the **Adoption of Resolution** took place and after a comprehensive deliberation, the **Nagpur Resolution** on "**Industry 4.0 and Energy Management**" was unanimously adopted by the participants.

Nagpur Resolution

on

"Industry 4.0 and Energy Management"

Nagpur, India
(20 January 2022)



We the participants of the two-day International Workshop on "**Industry 4.0 and Energy Management**", jointly organised by the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T CENTRE), New Delhi and the Society of Energy Engineers and Managers (SEEM), India during January 19-20, 2022;

Representing the Scientists, Academicians, Technocrats, Engineers, Consultants, Industrialists, Senior Officials, Policy Makers, Energy Managers and Energy Auditors from Egypt, India, Iraq, Mauritius, Myanmar, Nepal, Nigeria, Pakistan, Palestine, USA and Vietnam;

REALISING that the whole world is facing a serious environmental and energy crisis, thus investment in Industry 4.0 is a smart strategy for growing economies of the developing countries, improving competitiveness, and providing greater equity & opportunity in the future;

RECOGNISING that 'Industry 4.0 to Net Zero' is very much important towards building the clean energy economics of the future and the global need of the hour is the paradigm shift towards Industry 4.0 concept, to play a key role in achieving Net Zero with technologies of Industry 4.0;

CONSIDERING that there is a need for cooperation in Science, Technology & Innovation among the NAM and other developing countries on the promotion of Industry 4.0;

HAVING DELIBERATED on various aspects of Industry 4.0 and Energy Management and recalling that the aims of the workshop are:

- (a) to bring together the industry experts, academicians, energy professionals and the policy makers from the developing countries in area of Industry 4.0 and Energy Management.
- (b) to develop the synergy, exchange knowledge and share ideas on adoption of Industry 4.0 and associated issues of Energy Management.
- (c) to provide solutions with a broader perspective.

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REAFFIRMING that capacity building in technology development and transfer for Industry 4.0 should remain as one of the items on top of the agenda of an economy, as it is directly relevant to achieving Net Zero and relevant economic development;

ALSO BEING ATTAINITIVE of the necessity of the governments of the NAM and other developing countries to encourage technology transfer and commercialisation from universities and research centres to the enterprises on Industry 4.0 and Energy Management as a crucial activity in their respective national innovation systems;

UNANIMOUSLY RESOLVE AND RECOMMEND THE FOLLOWING:

- ♦ Governments and all other stakeholders are encouraged to view Industry 4.0 as a means to address economic and societal problems effectively and efficiently, reflecting the demands of the industrial sectors, and to generate collective participation of private sectors in creating robust economic development and addressing challenges faced by them.
- ♦ In this context, governments are requested to adopt innovative and ethical policies that support opportunities in Industry 4.0, thus ensuring that the smart industry takes its rightful role in contributing to net zero.
- ♦ Strategic and systematic plans considering cyber security issues and supportive government schemes are required to adopt application of Industry 4.0 for Energy Management and endorse its implementation.
- ♦ Adequate incentives may be provided by the governments of the NAM and other developing countries to industries for adopting Industry 4.0 and Energy Management.
- ♦ A mechanism should be developed for capacity building and technology transfer among scientists, young researchers and academia on Industry 4.0 and Energy Management.
- ♦ Eco-friendly energy technologies having zero impact on air, land and water resources may be implemented and the experience be widely shared.
- ♦ Institutional and policy framework to ensure implementation of Industry 4.0 and Energy Management may be adopted in all NAM and other developing countries.
- ♦ Identify existing gaps in policy, regulatory framework and technology arena and accordingly develop appropriate schemes to promote Industry 4.0 for Energy Management.
- ♦ Develop suitable protocols for Industry 4.0, benchmark energy consumption, and prepare appropriate action plans to reduce energy intensity and carbon footprint.
- ♦ Ensure that "Modern Energy Services" do not necessarily mean new equipment which directly or indirectly increases energy consumption, but rather it could be the improved versions of traditional systems and/or new energy efficient innovative products.
- ♦ Strengthen mechanisms for institution-industry collaboration for R&D, technology transfer and human resource development and to provide appropriate facilitation of sustainable energy market development.
- ♦ The informal, traditional, micro, small and medium scale manufacturing sectors should be transformed to become environmentally and financially sustainable by fostering R&D, capacity building and skill up-gradation so that they are globally competitive by adopting Industry 4.0 concepts.
- ♦ With strong foundation on Industry 4.0, industries should be encouraged to focus on resource efficiency, cleaner production practices and sustainable forms of energy.
- ♦ Emphasis should be given to continuous cooperation among developing countries to share best practices in matters related to Industry 4.0 and Energy Management.
- ♦ Establish a coordination mechanism to engage all the concerned government departments including energy, environment, science & technology, economic affairs, planning, health education, water, rural and urban development, industry, etc., while developing policies, regulations and financing mechanisms for Industry 4.0 due to its across-the-board impact.
- ♦ Strengthen information and communication activities for effective outreach and campaigns, soliciting active involvement of print, visual, electronic and social media to bring about positive attitudinal change towards adoption of Industry 4.0 and associated energy policies.

It was agreed that this Resolution may be submitted to the concerned authorities in the NAM and other developing countries for appropriate actions.

- ♦ **THUS, UNANIMOUSLY RESOLVED AND ADOPTED VIRTUALLY ON THIS DAY, 20th JANUARY 2022 IN NAGPUR, INDIA.**

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Even though the role and participation of women are generally recognized as critical, according to the WHO report on a gender perspective, women's participation in water sectors other than at the household level is considerably less than that of men. Women are also less acquainted with and exposed to the available scientific, eco-friendly water management strategies and technologies. This gender discrimination varies from region to region.

The Sustainable Development Goals (SDGs) focus on universal access to safe drinking water, basic sanitation, and hygiene (WASH) to address shortcomings widespread in low-and middle-income nations and for vulnerable people. Despite gender-related shortcomings, research on the intersection of gender and water is extremely limited and addressing gender-water disparities will necessitate focused resources to fill up the gaps. It is also noted that gender approaches are not being adopted at the policy and implementation level. Therefore, the water-gender inter-linkages need to be carefully examined and, subsequently, integrated into the national and international policies. Appropriate use of tools, effective and sustainable policies, monitoring the programs and projects, identifying the responsible institutions/organizations to make a decision on planning and implementation approaches are required to be addressed especially in developing countries.

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 **Gender Issues in Water Management in Developing Countries and Sustainable Development** during **February 22-23, 2022** with the aim to gain experience in gender and social equity approaches to water management, and assist the development of local knowledge and resources and facilitate dissemination of knowledge and information. The Workshop was hosted and organized by JSS AHER in Virtual-Mode.

The International Workshop was organized over 2 days period to provide basic knowledge on the subject through interactive lectures about various aspects of the role of 'Gender' in water management and explore the Gender-related issues and disruptive practices of water management in developing countries. During the workshop there were 4 Technical Sessions comprising 5 Keynote Lectures; 5 Plenary Lectures; 12 scientific papers; a Panel Discussion and adoption of Resolution, besides the Inaugural, and Concluding Sessions.

The Workshop was attended by **554** scientists, researchers, academicians, policy makers, students and other professionals from **15** countries namely; **Egypt (1), Iraq (1), Indonesia (1), Malaysia (1), Mauritius (2), Myanmar (11), Nepal (1), the Netherlands (1), Nigeria (1), Pakistan (1), Palestine (3), Sri Lanka (3), South Africa (2), United Kingdom (1)** and 524 participants from the host country **India**.

The **Inaugural Session** was initiated with an introduction by **Dr. Shivaraju HP**, Assistant Professor, JSS AHER and a welcome address by **Dr. B. Manjunatha**, Registrar, JSS AHER. **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre welcomed all the delegates and briefly discussed the idea behind conducting this Workshop. **Dr. Surinder Singh** welcomed all the participants and the experts from the NAM and other developing countries. He elaborated on how this workshop was structured and how the workshop would help to address the gender inequality in water management in developing countries. **Prof. Jon Samseth**, President of SCOPE, thanked the organizers and welcomed all the delegates, participants and experts. In his speech, he briefly mentioned about SCOPE and indicated how crucial this topic is in today's world. This was followed by an address by **Prof. B. Suresh**, Pro-Chancellor, JSS AHER, Mysuru and he briefly talked about the importance of this topic and gender-related challenges in water management in the developing countries. **Dr. C.G. Betsurmeth**, Executive Secretary, JSS Mahavidyapeetha, Mysuru in his Presidential Address talked about how women are primarily connected to water. He also discussed how water management is very necessary, as millions of people are facing difficulties in accessing fresh water.

The overall programme of the workshop was conducted in four technical sessions respectively chaired by **Prof. Manoj Kumar B**, JSS Science and Technology University, Mysuru, India; **Prof. V. Subramanian**, Former Professor, Jawaharlal Nehru University, New Delhi, India; **Dr. Tista Prasai Joshi**, Scientific Officer, Nepal Academy of Science and Technology, Nepal and **Dr. Catherine Anne Brown (Cate)**, Director and Senior Consultant, Southern Waters Ecological Research and Consulting CC, Cape Town, South Africa.

The technical programme of the workshop commenced with the **Keynote Address** delivered by **Prof. V. Subramanian** on **'Key Issues in the Water Sector in Asia'**. In his talk, he discussed various general issues on water and water security. He concluded by saying that desalination and air extraction may be novel approaches to optimizing the supply-demand gaps on a local scale in specific locations. There were four other Keynote addresses. During the session **Prof. Nnensi Kgabi**, Unit for Environmental Sciences and Management, North-West University, Potchefstroom, South Africa, in her lecture on **'Water, Gender and Climate: Connecting the Dots in Selected Developing Countries'** talked about water availability, interventions, drinking water sustainability and implications, Integrated Water Resource Management (IWRM) and gender considerations. In another **Keynote Lecture** by **Dr. Catherine Anne Brown (Cate)**, Director and Senior Consultant, Southern Waters Ecological Research and Consulting CC, Cape Town, South Africa on **'Why River Links are Important for Gender Equality'**, she explained why river links are important and how the quantity, quality and timing of the flow of water play a role to sustain freshwater ecosystem. She added that there are different indicators/components which tell about the water ecosystem and we should always consider all of them for our study. **Dr. Sonali Baliram Wakharde**, Assistant Professor, Department of Sociology, University of Mumbai, India in her presentation on **'Gender Issues in Water Management'** reflected on the feminist perspective and sociological perspective on water management. She said women are already practicing and managing water equitability and sustainability for years. Hence we should incorporate women's knowledge and experience into our programs and water policies at the management level and governance level. The fifth **Keynote Lecture** was delivered by **Prof. David Jenkins**, Associate Professor of Nanomaterials and Devices, University of Plymouth, United Kingdom on **'Ensuring a Robust Water-Energy-Food Nexus for Future Generations'** and in the Keynote lecture explained how much rivers are polluted from medicines and pharmaceutical products, and said that even the most modern and efficient wastewater treatment plants aren't completely capable of degrading these compounds before they end up in rivers or lakes.

There were 5 Plenary Lectures in Technical Session 1, the first lecture delivered by **Dr. Obiageli Evelyn Okafor**, Deputy Director, Raw Materials Research and Development Council (RMRDC), Nigeria on **'Gender Issues in Water Management**

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and Sustainable Development in Nigeria' and followed by Dr. Uma Chatterjee, Principal Scientist, CSIR-CSMCRI, Bhavnagar, India on **'Gender Issues in Water Management in Developing Countries and Sustainable Development'**. The other plenary lectures were delivered on: **'A Study for Developing and Managing Water Sanitation in Urban Slum'** by Dr. Neni Sintawardani, Senior Researcher, National Research and Innovation Agency (BRIN), Indonesia; **'Pollution Routing and Source Management as an Effective Alternative of Lake Pollution Management - A Case Study on Yele Malappa Shetty Lake'** by Mrs. Rakshitha R, Research Scholar, JSS Academy of Higher Education and Research, Mysuru, India and the fifth plenary lecture was on **'Development, Validation and Application of Multiplex PCR for Entamoeba Histolytica, Microsporidia and Cryptosporidium Spp.'** presented by Dr. Fatma El-zahraa Ramadan Saleh Ibrahim, Researcher, Institute of Environmental Research and Climate Changes, National Research Centre, Dokki, Egypt.

Regarding Indian participants two scientific presentations made in Technical Session 3 were on **'Sustainable Treatment of Contaminants of Emerging Concerns in Water and Waste Water'** delivered by Ms. Sneha Yadav, Research Scholar, JSS Academy of Higher Education and Research, Mysuru and **'Estimation of Water Budget Components and their Variability in the Godavari River Basin Using Remote Sensing Techniques'** by Dr. Aswin Kokka, Senior Project Associate, CSIR-National Geophysical Research Institute, Hyderabad. Three papers were presented in Technical Session 4; **'Microplastics Contamination in Urban Water System: A Risk Assessment and Mitigation'** by Mr. Jijoe Samuel, Research Scholar, JSS Academy of Higher Education and Research, Mysuru; **'Computer-Aided Drug Discovery Approaches against Alzheimer's Disease caused due to Aluminium Concentration in Drinking Water'** by Ms. Sushma P., Research Scholar, JSS Academy of Higher Education and Research, Mysuru and Dr. Surajit Chakraborty, Indian Institute of Social Welfare and Business Management (IISWBM), Kolkata made a presentation on **'Explaining the Migration of Arsenic by Numerical Modeling of Groundwater of Central Bengal Basin and its Societal Implications'**.

Other scientific papers presented during various sessions include three presentations in Technical Session 2 on **'Challenges and Opportunity in Making Water - A Sustainable and Competitive Sector in Malaysia'** by Prof. Zulkifli Bin Yusop, Chair Water Committee, Academy of Science Malaysia, Malaysia; **'Application of Capacitive Deionization (CDI) Technology for Treating the Brackish Ground Water in Dala, Yangon, Myanmar'** by Prof. Seinn Lei Aye, Professor and Head of the Department (Civil), Department of Environment and Water Studies, University of Yangon, Myanmar; **'Adsorption and Removal of Dimethylarsinic Acid (DMA) from Water'** by Dr. Tista Prasai Joshi, Scientific Officer, Nepal Academy of Science and Technology, Nepal. Two papers presented in Technical Session 3 were: **'Role of Community Based Organizations in Water Governance: A Case Study from Sri Lanka'** was jointly delivered by Dr. S.N.C.M Dias, Senior Lecturer, Centre for Environmental Studies & Sustainable development, the Open University of Sri Lanka, Mrs. Samantha Ginthota Manawadu, Teaching Assistant, University of Vocational Technology, Sri Lanka; and Mr. Tharinda Dasun Denagama, Lecturer, University of Vocational Technology, Sri Lanka and on **'Water Usage and Management: A Gendered Perspective'** by Mrs. Beebejaun-Muslum Zareen Nishaat, Lecturer, Mahatma Gandhi Institute, Mauritius. Two more presentations in Technical Session 4 were **'Waste Water Treatment of Sewage Ponds to Protect the Environment by Eco-Friendly Technique Phytoremediation'** by Dr. Ayesha Sumreen, Research Officer, Pakistan Council of Research in Water Resources (PCRWR), Pakistan and the paper entitled **'Water Treatment for Hemodialysis in Baghdad Medical City, Iraq'** was presented by Dr. Yasamen Raad Humadat, Researcher, Environment and Water Directorate, Ministry of Science and Technology, Baghdad, Iraq.

The session on **Panel Discussion and Adoption of Resolution** was chaired by Prof. David Jenkins from the University of Plymouth, United Kingdom and the Panel Members were Prof. Jon Samseth, President, SCOPE (Norway); Dr. Catherine Anne Brown (South Africa); Prof. Raveesha KA, Prof. V. Subramanian and Dr. Sonali B. Wakharde (India) and Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre. The discussion was moderated by Dr. S. Suriyanarayanan (SCOPE India) and Dr. Shivaraju H. P. (JSS AHER, India). The Panelists discussed the human resource development needs required on the gender issues in water management, and a few other steps that must be taken to meet the needs of the future.

Discussions were held on the Adoption of Resolution and after a comprehensive deliberations, the Mysuru Resolution on **"Gender Issues in Water Management in Developing Countries and Sustainable Development"** was unanimously adopted by the participants.

Concluding Session ended with Prof. Jon Samseth and Dr. Amitava Bandopadhyay thanking all the distinguished participants and all other delegates for their active participation in the workshop.



Mysuru Resolution

ON

"Gender Issues in Water Management in Developing Countries and Sustainable Development"

Mysuru, India
(23 February 2022)



We, the participants of the 2-day International Workshop on "Gender Issues in Water Management in Developing Countries and Sustainable Development", held during 22-23 February 2022;

Representing governments, academic and research institutions and S&T agencies from Egypt, India, Indonesia, Iraq, Malaysia, Morocco, Myanmar, Nepal, Nigeria, Pakistan, South Africa, Sri Lanka and United Kingdom; as well as other relevant stakeholders;

RECOGNIZING the importance of gender-related issues in water resource management in developing countries and the role and status of women in water use and management, and identifying feasible strategies to empower them in the overall water governance;

REALIZING that women play a central part in the provision, management and safeguarding of water and in achieving SDG 5 to ensure Women Gender Equality under the UN Sustainable Development Agenda 2030;

RECALLING the aims of the workshop – to bring together experts from NAM and other developing countries in Water Science & Technology, related ecosystem and services and socio-economic sectors as well as members of planning and policy groups working towards gender equity and gender-related issues in water resource management in developing countries;

REAFFIRMING that capacity-building in "Gender Issues in Water Management" should remain as one of the items on top of the agenda working with a Multi-stakeholder Coalition made up of NAM Member Nations and to accelerate the achievement of gender equality in the water domain;

UNANIMOUSLY RESOLVE AND RECOMMEND the following:

- ✦ Governments and all other stakeholders should encourage and adopt the UN Policy Brief on Gender, Water and Sanitation to promote the gender-responsive water, sanitation, and hygiene that can be a catalyst for change across the developing world in regard to "Agenda for Sustainable Development 2030";
- ✦ Strategic and systematic plans and supportive government schemes are required to adopt gender equality and endorse its implementation. In this context, governments should adopt and develop new policies that allow men and women to participate directly in decision-making at all levels with regard to water and sanitation;
- ✦ Respective governments should provide technical help and training to water management organizations in order to improve women's training and participation in water-related fields such as construction, maintenance, technical services, and water governance;
- ✦ Governments should ensure that while planning of Water Sanitation and Hygiene (WASH), gender equality should be taken into consideration. SDG 6's WASH and Water Governance Targets (including domestic access to services, trans-boundary water management, reducing water pollution, increasing water efficiency, and restoring water-related ecosystems) have enormous potential to mutually reinforce positive gender equality (Goal 5) outcomes and reduce overall inequality (Goal 10). Increasing the voices of gender-discriminated persons at all levels (global, national, and local) can help achieve these integrated SDG targets;
- ✦ Governments should ensure that women are represented equally in the water management and governance processes;
- ✦ Mechanisms should be devised to address legal discrimination against women and girls, as well as sexual assault associated with open defecation, and to ensure women's access to resources;
- ✦ Governments, non-governmental organizations, and academic institutions should address the paucity of gender-specific indicators and dis-aggregated WASH data for tracking SDG progress;
- ✦ Governments and NGOs should raise funds for water resources and sanitation infrastructure needs;
- ✦ As per the suggestions outlined in UN Policy on Water and Gender, Governments should ensure and review the status of adequate allocation of resources and facility to utilize grants to improve access to safe water and sanitation;
- ✦ The legislation should be strengthened and access to land and water for productive uses be provided through recognition of women's important role in agriculture, livestock and fisheries and encouraging women become decision-makers and owners
- ✦ National level development and implementation of a gender sensitive water policy framework should be facilitated;
- ✦ The Member Countries of the NAM S&T Centre and other stakeholders should ensure that gender inequities and WASH targets are included in a health goal to improve access to toilets and other sanitary facilities for women and girls;

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 VIRTUALLY ON THIS DAY, THE 23rd February, 2022 at Mysuru, India.

New Publication

Xavier Poshiwa
G. Ravindra Chary *Editors*

Climate Change Adaptations in Dryland Agriculture in Semi-Arid Areas

 Springer

CLIMATE CHANGE ADAPTATIONS IN DRYLAND AGRICULTURE IN SEMI-ARID AREAS

Across the world many countries have "arid" or "semi-arid" climates and it is well known that drylands represent more than a third of the world's landmass, 90% of which are in developing countries. Further, there are pronounced differences within drylands, particularly in terms of water availability, poverty, stage of development and sustainable intensification options. Climate change and agriculture are interrelated processes that take place at a global scale. The impacts of climate change on agriculture in developing countries depend on the extent to which agricultural production in the semi-arid regions adapt to the influences of climate change.

NAM S&T Centre has gone ahead to explore how to avoid the short and long term effects of climate change and the adaptation strategies that can minimize such effects by bringing out the Monograph entitled **Climate Change Adaptations in Dryland Agriculture in Semi-arid Areas**.

This book comprising 26 chapters highlights the approaches for achieving trans-disciplinary research integration for "semi-arid dryland agriculture systems" under changing climates, while also identifying the elements of a collaborative research agenda that are needed to advance global food security.

The book has brought together ideas that will transform lives and build adaptation capacities, thereby providing the much-needed products in communities and thus leading to development.

Foreword: Prof. Dr. Amon Murwira (Zimbabwe)

Preface: Dr. Xavier Poshiwa (Zimbabwe) and Dr. G. Ravindra Chary (India)

Introduction: Dr. Amitava Bandyopadhyay (India)

CLIMATE CHANGE ADAPTATIONS IN DRYLAND AGRICULTURE

1. **Climate Resilient Rainfed Agriculture: Experiences from India** - G. Ravindra Chary, S. Bhaskar, K. A. Gopinath, M. Prabhakar, J. V. N. S. Prasad, C. A. Rama Rao, and K. V. Rao
2. **Examining the Potential Impacts of Agro-Meteorology Initiatives for Climate Change Adaptation and Food Security in Bhutan** - Tshering Wangchen and Tshencho Dorji
3. **Climate Change Mitigation: In Situ Management Methods of Indigenous Fruit Trees in Chivi Communal Area, Masvingo Province, Zimbabwe** - Marumure Jerikias and Makuvara Zakio
4. **The Effect of Temperature and Rainfall Changes on Biophysical and Socio-Economic Status of People in Northern Jordan Valley Drylands, Palestine** - A. Rasem Hasan, Abdallah Alimari, Hanan A. Jafar, Amjad I. A. Hussein, and Ahmed A. Abu Shaban
5. **An Assessment of Meteorological Drought Variability in Representative Areas of Rajasthan** - Era Upadhyay and Jhumoor Biswas
6. **Building Resilience to Climate Change: A Case Study of Female Headed Households in Arid Region of Buhera District, Zimbabwe** - L. Ruparanganda and C. Nyoni

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7. **Halophytes of Semi-Arid Areas: Resources for Mitigation of Climate Change** - *Doongar R. Chaudhary*
8. **Selection of Resilient Crop Species for Cultivation Under Projected Climate Change** - *Deepa Shree Rawal*
9. **Livestock Based Production Systems for Climate Adaptation in Dryland Areas** - *D. B. V. Ramana*

RESEARCH AND DEVELOPMENT IN DRYLAND AGRICULTURE

10. **Aqueous Leaf Extracts of Sunflower (*Helianthus annuus*) for Weed Management** - *K. Makaza, M. Matigimu, and N. Sakadzo*
11. **Food Systems in Dryland Communities: Challenges and Opportunities in Gutu District, Masvingo Province, Zimbabwe** - *Tendayi Mutimukuru-Maravanyika, Lazarus Chapungu, and Felix Majeke*
12. **Potential of In-Field Rainwater Harvesting to Improve Resilience of Dryland Cropping in Smallholder Farms of Zimbabwe: A Review** - *Misi Amos Manyanga, Gabriel Soropa, and Munjonji Lawrence*
13. **Developing Pathways for Sustainable Agricultural Development in Zimbabwe** - *Sabine Homann-Kee Tui, Gevious Sisito, Elisha N. Moyo, Thulani Dube, Roberto O. Valdivia, Malgosia Madajewicz, Katrien Descheemaeker, and Alex C. Ruane*
14. **Role of Soil Survey and Soil Testing for Agricultural Development in Zimbabwe** - *Misi Amos Manyanga, Emmanuel Chikwari, and Tonny Phirilani Tauro*
15. **Potential Blue Zone Status of the Dryland Area of Buhera District in Zimbabwe: Development of a Hypothesis** - *I. Nyambiya*
16. **Optimizing Productivity in Semi-Arid Dryland Agriculture for Developing Countries: Insights from Zimbabwe** - *E. Dahwa, C. P. Mudzengi, M. Mubvuma, T. Maravanyika, L. Chapungu, and E. Chikodza*
17. **Land Use Systems and Soil Quality Indicators in a Fersiallitic (5e) Soil at Matopos Research Farm in Zimbabwe** - *Jephias Dera, Canisio Mataga, and Neil Mandinyenya Zhou*
18. **The Effect of Ridging and Phosphorus Application on *Neorautanenia Brachypus* (Harms) Vegetative Growth and Tuber** - *C. Pisa, D. Sibanda, X. Poshiwa, and T. P. Tauro*
19. **Effects of Different Seed Pre-treatments on Enhancing Germination of Selected Indigenous Plant Species in Chivi District, Masvingo, Zimbabwe** - *Zakio Makuvara, Jerikias Marumure, and Pardon Chidoko*
20. **Impact of Mobile Night Kraals on Soil PH in Crop Fields - A Pilot Study** - *Rutendo P. C. Nyamusamba*

LIVESTOCK FEEDING AND ALTERNATIVE PRODUCTION SYSTEMS IN SEMI-ARID AREAS

21. **A Strategic Livestock Feeding Framework for Semi-Arid Areas** - *Clarice Princess Mudzengi, Everson Dahwa, and Clayton Simbarashe Kapembeza*
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23. **Utilisation of Cactus (*Opuntia ficus-indica*) in Mitigating Drought Effects on Livestock in Matabeleland South Province of Zimbabwe** - *M. Banga, B. E. Maburutse, C. J. Mugova, T. P. Tauro, and C. Pisa*
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25. **Seaweed Biostimulants for Climate Change Adaptations in Dryland Agriculture in Semi-arid Areas** - *Vijay Anand K. Gopalakrishnan and Arup Ghosh*

RISK COPING IN DRYLANDS

26. **Risk Management in Rainfed Agriculture in India** - *C. A. Rama Rao, B. M. K. Raju, Josily Samuel, and G. Ravindra Chary*

Centre Welcomes

JSS Academy of Higher Education & Research (JSS AHER), Mysuru, India as a New Member of the NAM S&T - Industry Network



The NAM S&T Centre warmly welcomes the JSS Academy of Higher Education & Research (JSS AHER), Mysuru, Karnataka, India (www.jssuni.edu.in) as an esteemed Member of the NAM S&T - Industry Network with effect from April 1, 2022.

JSS Academy of Higher Education & Research was established in the year 2008, with a founding mission to serve the needs of the community at large and envisions emerging as a unique institution in the Higher Education setting.

JSS AHER since its establishment has significantly strengthened its Teaching, Research and Service efforts to realize its vision and mission. Under the leadership and gracious Patronage and blessings of His Holiness Jagadguru Sri Shivarathri Deshikendra Mahaswamiji, the Chancellor of JSS Academy of Higher Education & Research; Honourable Pro Chancellor Dr. B. Suresh, a noted multifaceted leader in the field of education in India, and Dr. Surinder Singh, Vice Chancellor, an expert in healthcare regulations, JSS AHER has made great progress in grooming graduates, postgraduates and Ph. D. researchers of great acumen by providing effective, value based education, giving importance to overall development of an individual through state-of-art facilities to make the learner a useful citizen to the country.

JSS Academy of Higher Education & Research, Mysuru is a Health Science focused Higher Education Institution and comprises of Faculties of Medicine, Biomedical Sciences, Pharmacy, Dentistry, Life Sciences and Management Studies. It has, as its constituent colleges the JSS Medical College, the JSS Dental College & Hospital and the JSS College of Pharmacy at its main campus at Mysuru and the JSS College of Pharmacy at Ootacamund, Tamil Nadu (off-campus). Besides the four constituent colleges, the deemed university has established three departments, namely the Department of Water and Health, the Department of Health System Management Studies and the Department of Yoga. Today, more than 650 faculty members instruct approximately 3500 undergraduates, 2500 graduate students and around 700 research scholars. It has more than 300+ international students from 25+ countries studying at JSS AHER.

In the **Times Higher Education (THE) World Rankings 2022**, **JSS Academy of Higher Education & Research was ranked in the band of 351- 400 in the world**. JSS AHER is amongst the top 8 of the world and number 1 in India for the citations generated from its publications. Nationally, JSS Academy of Higher Education & Research also ranks amongst top 50 Universities/Higher Education Institutions in India for the last six consecutive years by the National Institutional Ranking Framework by MHRD, Government of India.

'Quality' and 'Excellence' have been the key drivers of the JSS AHER which is evident from the various strides it has made in the benchmarking initiatives nationally and internationally in a short span of twelve years. The good governance structure and extraordinary leadership of the institution has played a catalyst's role for it to progress quickly and continue its journey to the next level of advancement.

The remarkable growth of the institution in a short span of time is due to Eminent Leadership, Good Governance, Academic Excellence, Experienced Faculty, National and International Student Diversity, Research Excellence, and Infrastructure that meets the needs of the academics, research, extension and student support.

For further information on JSS Academy of Higher Education & Research, Mysuru please visit www.jssuni.edu.in.

Science, Technology & Innovation News

Environmental Policy

UNEA: Uruguay, Costa Rica Back Formation of Science-Policy Panel to Manage Chemicals, Waste

The proposed panel on chemicals and waste is expected to fill the gap between science and policy. The world missed the 2020 target to achieve environmentally sound management of chemicals and all wastes throughout their life cycles, in accordance with agreed international frameworks, said the United Nations. The target was included under UN-mandated Sustainable Development Goal 12 to ensure sustainable consumption and production patterns. In this context, a science policy panel could support UN agencies, global multilateral agreements and other international instruments, such as the beyond 2020 instrument for the sound management of chemicals and waste. The draft resolution was taken up for discussion on February 22, 2022, the resolution for the science-policy panel is motivated by the need to, inter alia, engender cooperation with other environmental regimes that have established science-policies interfaces like the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The resolution is linked to the human right for a healthy environment and therefore, received the support of Uruguay and Costa Rica. The language of the draft should be in alignment with the Rio+20 Outcome document *The Future We Want*, Brazil proposed. The challenges faced by existing science-policy interfaces, including IPCC and IPBES, must be considered, Chile suggested. Chile also called for attention to the challenges related to finances, the representation of developing country experts and voices. It is important to harmonise language to avoid contradictions too, said the South American Nation. The draft refers to actions on three aspects — chemicals, waste and pollution—collectively. **"The panel would support countries and the private sector in their work to take action on chemicals, waste and pollution by providing authoritative, independent, credible, inclusive, policy-relevant scientific advice on issues,"** said the draft. But the US called for separating pollution from issues under the chemicals and waste cluster of conventions.

February 25, 2022; www.downtoearth.org.in

Global Treaty to Cut Plastic Production Needed Urgently: EIA Report Ahead of UN Summit

A new global plastics treaty that takes into account the entire lifecycle of plastics needs to be developed urgently, a new report highlighted. Addressing the problem of plastic pollution must begin when plastic is produced as a material, the report by the non-profit Environmental Investigation Agency (EIA) of the United Kingdom said. This was also proposed in the draft resolution by Peru and Rwanda at the United Nations Environment Assembly (UNEA) 5. Implementation of resolutions on marine litter and microplastics is likely to be discussed at the meeting. The rise in plastic pollution spilling into the environment is a planetary emergency, highlighted Tom Gammage, an ocean campaigner with EIA in the report *Connecting the Dots: Plastic pollution and the planetary emergency* published in January 2022. The report puts together recent scientific data on the impacts of plastics on climate, biodiversity, human health and the environment. It was released ahead of the second part of UNEA 5 in Nairobi, Kenya. The meeting is expected to redefine and decide every nation's relationship with plastic. It recommends ways to enforce multidimensional, long-term and collaborative policies to tackle plastic pollution. Over 70 consumer brands including Coca-Cola, PepsiCo, Unilever and Ikea, who contribute significantly to the global plastic pollution, issued a joint statement on January 17, 2022 calling for a global treaty to fight plastic pollution that would include reducing the production of the material. **"We are at a critical point in time to establish an ambitious UN treaty that fosters collaboration for systemic solutions and speeds up the transition to a circular economy globally",** the companies said, adding that the world cannot afford to miss it.

January 20, 2022; www.downtoearth.org.in

AGRICULTURE

Growing Rice with Aquatic Animals Boosts Production and Reduces Chemical Use

A study shows that growing carp, mitten crabs, or soft-shell turtles in rice paddies could help farmers produce food in a more sustainable way.

Growing rice alongside aquatic animals can reduce the need for chemical fertilisers and pesticides, as well as increase farmers' yields, shows a study published in *eLife*. The results suggest a way to help reduce the environmental harms associated with rice production, with potential economic benefits for rice farmers. Modern farms often grow one type of crop and require large amounts of fertilisers and pesticides. This has helped increase crop production but at the cost of increased environmental degradation. Some farmers are experimenting with growing a mixture of crops and animals to reduce the need for agricultural chemicals by taking advantage of beneficial interactions between plants and animals. "One example includes farmers experimenting with growing aquatic animals in rice paddies," says co-first author Liang Guo, Postdoctoral Fellow at the College of Life Sciences, Zhejiang University, Hangzhou, China. "Learning more about how these animals contribute to rice paddy ecosystems could help with producing rice in a more sustainable way." Guo and colleagues conducted three experiments, each lasting for four years, to compare the growth of rice alongside carp, mitten crabs, or soft-shell turtles with rice is grown alone. They found that the aquatic animals reduced weeds, increased the decomposition of organic matter, and improved rice yields compared to the rice that was grown alone. "We also saw that nitrogen levels in the soil remained steady in the rice paddies with aquatic animals, reducing the need for using nitrogen-based fertilisers," says co-first author Lufeng Zhao, a PhD student at the College of Life Sciences, Zhejiang University. The team next examined what the animals ate in the rice paddies. They found that 16-50% of their diet was made up of plant and other materials they scavenged, rather than their feed. They also found that the rice plants used around 13-35% of the nitrogen from leftover feed that was not eaten by the animals. Growing rice with aquatic animals resulted in yields that were between around 8.7% and 12.1% higher than yields of rice grown alone. Additionally, farmers were able to grow between 0.5 and 2.5 tonnes of crabs, carp, or turtles per hectare alongside their rice. "These results enhance our understanding of the roles of animals in agricultural ecosystems, and support the view that growing crops alongside animals have a number of benefits," concludes Xin Chen, Professor of Ecology at the College of Life Sciences, Zhejiang University, and co-senior author of the study alongside Dr Liangliang Hu and Professor Jianjun Tang. "In terms of rice production, adding aquatic

(Contd. from Page 11 - STI News)

animals to paddies may increase farmers' profits as they can sell both the animals and the rice, spend less on fertiliser and pesticides, and charge more for sustainably grown products."

February 22, 2022; www.sciencedaily.com

MATERIAL SCIENCE

A New, Inexpensive Catalyst Speeds the Production of Oxygen from Water

An electrochemical reaction that splits apart water molecules to produce oxygen is at the heart of multiple approaches aiming to produce alternative fuels for transportation. But this reaction has to be facilitated by a catalyst material, and today's versions require the use of rare and expensive elements such as iridium, limiting the potential of such fuel production. Now, researchers at MIT and elsewhere have developed an entirely new type of catalyst material, called a metal hydroxide-organic framework (MHO), which is made of inexpensive and abundant components. The family of materials allows engineers to precisely tune the catalyst's structure and composition to the needs of a particular chemical process, and it can then match or exceed the performance of conventional, more expensive catalysts. The findings by MIT postdoc Shuai Yuan, graduate student Jiayu Peng, Professor Yang Shao-Horn, Professor Yuriy Román-Leshkov, and nine others are described in a paper published in the journal *Nature Materials*. Oxygen evolution reactions are one of the reactions common to the electrochemical production of fuels, chemicals, and materials. These processes include the generation of hydrogen as a by-product of the oxygen evolution, which can be used directly as a fuel or undergo chemical reactions to produce other transportation fuels; the manufacture of ammonia, for use as a fertilizer or chemical feedstock; and carbon dioxide reduction in order to control emissions. These catalysts for reactions "are all relying on expensive materials or late transition metals that are very scarce, for example, iridium oxide, and there has been a big effort in the community to find alternatives based on Earth-abundant materials that have the same performance in terms of activity and stability," Román-Leshkov says. The team says they have found materials that provide exactly that combination of characteristics. Now, though, "the reason our work is quite exciting and quite relevant is that we've found a way of tailoring the properties by nanostructuring these metal hydroxides in a unique way", the team borrowed from research that has been done on a related class of compounds known as metal-organic frameworks (MOFs). By replacing the metal oxide in such materials with certain metal hydroxides, the team found, it became possible to create precisely tunable materials that also had the necessary stability to be potentially useful as catalysts. This has multiple benefits, by allowing a precise control over the nanostructured patterning, allowing precise control of the electronic properties of the metal, and also providing greater stability, enabling them to stand up to long periods of use. In testing such materials, the researchers found the catalysts' performance to be "surprising," Shao-Horn says. "It is comparable to that of the state-of-the-art oxide materials catalyzing for the oxygen evolution reaction." This family of materials "really offers a new space to tune the active sites for catalyzing water splitting to produce hydrogen with reduced energy input," Shao-Horn says, to meet the exact needs of any given chemical process where such catalysts are needed. The materials can provide "five times greater tunability" than existing nickel-based catalysts, Peng says, simply by substituting different metals in place of nickel in the compound. "This would potentially offer many relevant avenues for future discoveries."

February 25, 2022; www.phys.org

HEALTH & ENVIRONMENT

Child Asthma Cases Linked to Cities' Dirty Air

Reducing air pollution should be a crucial part of health strategies for children, as nitrogen dioxide (NO₂), may lead to nearly 2 million new child asthma cases a year as suggested in a research study. Researchers from George Washington University in the US say it is the first study to estimate the global burden of asthma cases in children resulting from NO₂ emissions in more than 13,000 cities. "Our study found that nitrogen dioxide puts children at risk of developing asthma and the problem is especially acute in urban areas," said Susan Anenberg, study co-author and a professor of environmental and occupational health at the university, in Washington DC. Asthma affects around 262 million people worldwide, according to the 2019 Global Burden of Disease study, and is the most common chronic disease among children, causing inflammation of the lung's airways. Most asthma-related deaths occur in low- and middle-income countries where it is often under-diagnosed and under-treated, according to the World Health Organization. By analysing ground concentration of NO₂ and new cases of asthma in children from 2000 to 2019, researchers observed that, in 2019, an estimated 1.85 million new cases of childhood asthma were attributable to NO₂ worldwide, and two thirds of these cases (1.22 million) were in urban areas. NO₂ pollution has been increasing in South Asia, Sub-Saharan Africa, and the Middle East, the researchers found, while air quality has shown improvements in Europe and the US. Explaining the connection between NO₂ and childhood asthma, the researchers said: "NO₂ itself has been associated with adverse health outcomes including asthma exacerbation. Epidemiological studies have also found associations between transportation-related air pollutants [such as NO₂] and new onset asthma in children." "The report suggests that monitoring environmental levels of nitric dioxide could serve as a surrogate marker [an indicator of a disease state] for regions of high risk for increased childhood asthma incidence as well as an indicator of the efficacy of mitigation measures for air pollution." Szeffler was the lead author of a study published in 2020 in the journal *Pediatric Pulmonology*. Sushmita Roychowdhury, director of pulmonology at Fortis Hospital, in Kolkata, India, says that paediatric asthma is becoming more common in highly populated cities. "Children living in high-rises close to the main busy arterial roads are found to have more symptoms early on," she said. "Most children in urban India waiting for school buses in the morning or those taking public transport are exposed to high concentrations of pollutants."

January 27, 2022; www.scidev.net

Haiti's Population High Lead Levels as a Warning for Other Countries

Blood lead levels among the population of Haiti's capital Port-au-Prince are on average five times higher than in the United States, say researchers, highlighting the urgent need to address the problem in developing countries more broadly. In high-income countries, lead exposure is associated with cardiovascular disease and higher blood pressure, but the link has not been adequately evaluated in low- and middle-income countries, say the authors of a study published in the journal *Hypertension*. Lily Yan, a researcher at Weill Cornell Medicine, in New York, and a co-author of the paper, told: "Although we

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suspected that lead levels could be high in Port-au-Prince, we were surprised by how extensive it was." The authors suggest that population levels of lead should be measured routinely in low-income countries as part of efforts to tackle cardiovascular disease, the leading cause of death worldwide, according to the WHO. According to UNICEF, lead is a highly poisonous element that is responsible for nearly 1.5 per cent of annual global deaths – almost as many as from HIV and AIDS, and more than from malaria. Lead poisoning affects nearly a third of the world's children, the UN children's agency estimates. The scientists behind the Haiti study say they now want to continue their research by analysing possible sources of lead exposure in the island nation. "In low and middle-income countries, one of the main sources of lead exposure is car batteries recycling, which is the most common use of lead today. Lead is also added to spices to make them more colourful". Jack Caravanos, an environmental health expert at New York University, told that heart disease from lead exposure was "a problem that can be solved". "Hypertension is a very complicated disease" and with many causes, added Caravanos. "And if we start eliminating them, either through diet or toxins, we are sure to have an improvement in heart health, which is the biggest challenge."

January 11, 2022; www.scidev.net

GLOBAL WARMING & CLIMATE CHANGE

Ocean Acidification and Global Warming Affecting Seafood Supplies

Ocean acidification and global warming are interfering with the way fish interact in groups, posing a threat to their survival which could affect seafood supplies, researchers say. Marine ecosystems worldwide have shown an increased dominance of warm water species following seawater temperature rise, with parallel changes in the species composition of fish catches since the 1970s, according to a report by the Intergovernmental Panel on Climate Change (IPCC). "Fish show gregarious behaviour and cluster in shoals which helps them to acquire food and protects them against predators," says Ivan Nagelkerken, professor at the University of Adelaide's Environment Institute and Southern Seas Ecology Laboratories and author of a study on the effect, published in *Global Change Biology*. Under controlled laboratory conditions, the researchers observed how species interacted and behaved in new ways with changing temperature and acidification. While warming and acidification are different phenomena, they interact to the detriment of marine ecosystems. According to Nagelkerken, mixed shoals of tropical and temperate species became less cohesive under future climate conditions and showed slower escape responses from potential threats. Strong shoal cohesion and coordinated movement, whether to acquire food or evade predators, are important for fish survival. "Species are extending their ranges pole-wards as the oceans warm due to climate change," says Nagelkerken. "This process, known as tropicalisation of temperate ecosystems, means tropical species are mixing with temperate species and creating novel ecological interactions." "Altered schooling behaviour by fishes due to climate change and novel species' interactions can affect their survival and growth rates, and hence can alter their population sizes and, therefore, potentially also their catches." Nagelkerken says natural climatic oscillations, such as El Nino and La Nina, can also have an impact. Scott Doney, a professor at the environmental change department of the University of Virginia, Charlottesville, tells, that climate change and ocean acidification from human emissions of carbon dioxide not only causes tropical fish to expand their habitat ranges into temperate regions but "fish physiology and metabolism may be altered by the simultaneous effects of seawater warming and chemical changes associated with acidification." "This systematic lab study of multiple environmental factors is an important step forward in understanding possible climate change impacts on the ocean," says Doney.

January 13, 2022; www.scidev.net

BIOTECHNOLOGY

China's Approval of Gene-Edited Crops

Researchers in China are excited by their government's approval of gene-edited crops, which they say clears the way for the plants' use in agriculture and should boost research into varieties that are tastier, pest-resistant and better adapted to a warming world. Since China's agriculture ministry released preliminary guidelines on 24 January, researchers have been hurrying to submit applications for the use of their gene-edited crops. These include the development of wheat varieties resistant to a fungal disease called powdery mildew, which are described in a paper in *Nature*. "This is very good news for us. It really opens the door for commercialization," says plant biologist Caixia Gao at the Chinese Academy of Sciences' Institute of Genetics and Developmental Biology in Beijing, who is a co-author of the paper. China's new rules are more conservative than those in the United States - which does not regulate gene-edited crops that incorporate small changes similar to those that could occur naturally - but are more lenient than the tough European Union stance of treating all gene-edited crops as genetically modified (GM) organisms. Gene-edited crops are developed using technologies such as CRISPR-Cas9 that can make small tweaks to DNA sequences. They differ from crops obtained by genetic modification because this typically involves the insertion of entire genes or DNA sequences from other plant or animal species. However, until now, in China, they have come under the same legislation as that covering GM organism. Currently, it can take up to six years to get biosafety approval for a GM crop in China. But researchers say the new guidelines — which lay out the process for receiving a biosafety certificate for gene-edited crops - could reduce the approval time to one to two years. GM crops require extensive, large-scale field trials before they are approved for use.

February 11, 2022; www.nature.com

ARTIFICIAL INTELLIGENCE & ROBOTICS

Ensuring Artificial Intelligence (AI) Technologies for Health Benefit Older People

Geneva: Artificial intelligence (AI) technologies have the potential to improve older people's health and well-being, but only if ageism is eliminated from their design, implementation, and use. A new policy brief, *Ageism in artificial intelligence for health*, released by the World Health Organization (WHO) presents legal, non-legal and technical measures that can be used to minimize the risk of exacerbating or introducing ageism through these technologies. AI technologies are revolutionizing many fields including public health and medicine for older people where they can help predict health risks and events enable drug development, support the personalization of care management, and much more.

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"To ensure that AI technologies play a beneficial role, ageism must be identified and eliminated from their design, development, use and evaluation. This new policy brief shows how." The following eight considerations could ensure that AI technologies for health address ageism and that older people are fully involved in the processes, systems, technologies and services that affect them.

- Participatory design of AI technologies
- Age-diverse data science teams
- Age-inclusive data collection
- Investments in digital infrastructure and digital literacy for older people and their health-care providers and care givers
- Rights of older people to consent and contest
- Governance frameworks and regulations to empower and work with older people
- Increased research to understand new uses of AI and how to avoid bias
- Robust ethics processes in the development and application of AI

The policy brief aligns with the messages of the *Global report on ageism* which serves as the basis for the Global Campaign to Combat Ageism. Produced by WHO in collaboration with OHCHR, UNDESA and UNFPA and launched in March 2021, the *Global report on ageism* notes that ageism is both highly prevalent and harmful but can be eliminated. As a first of its kind, the report describes the far-reaching impacts that ageism has on all aspects of health and well-being and on economies and signals a clear need to invest in three proven strategies: policy and law, educational activities, and intergenerational interventions. It also highlights the need to improve data and research on ageism and change the narrative around age and ageing to create #AWorld4AllAges

February 9, 2022; www.who.int

Geographic Hints Help a Simple Robot Navigate for Kilometers

The way most robots navigate is very different from the way most humans navigate. Robots are happiest when they have total environmental understanding, with some sort of full geometric reconstruction of everything around them plus exact knowledge of their own position and orientation. Lidars, pre-existing maps, powerful computers, and even a motion-capture system if you can afford it—the demands of autonomous robots never end. Obviously, this stuff doesn't scale all that well. With that in mind, Dhruv Shah and professor Sergey Levine at the University of California, Berkeley, are working on a different approach. Their take on robotic navigation does away with the high-end, power-hungry components. What suffice for their navigation technique are a monocular camera, some neural networks, a basic GPS system, and some simple hints in the form of a very basic human-readable overhead map. Such hints may not sound all that impactful, but they enable a very simple robot to efficiently and intelligently travel through unfamiliar environments to reach far-off destinations. If that little robot looks familiar, that's because we met it a couple of years ago through Greg Khan, a student of Levine's. Back then, the robot was named BADGR, and its special skill was learning to navigate through novel environments based on simple images and lived experience—or whatever the robot equivalent of lived experience is. BADGR has now evolved into ViKiNG, which stands for "Vision-Based Kilometer-Scale Navigation with Geographic Hints," which is a slightly less forgivable acronym. While BADGR was perfectly happy to wander around small areas, its successor is intended to traverse long distances in search of a goal, which is an important step toward practical applications. Using either a satellite map or a road map, ViKiNG can make more-informed choices about what short-term goals to aim for, vastly increasing the likelihood that it'll achieve its objectives. Even with a road map, ViKiNG is not restricted to roads; it just may favor roads because that's the information it has. Satellite images, which include roads but also other terrain, give the robot more information to work with. The maps are hints, not instructions, which mean that ViKiNG can adapt to obstacles it wasn't expecting. "In contrast to autonomous-driving systems that use enormous software stacks with many interacting components, this system uses two neural networks (one to process first-person images, and one to process the map images) and a planning algorithm that uses them to decide where to drive. This is significant because the complexity of today's robotic navigation systems is one of the big obstacles preventing their large-scale deployment.

March 9, 2022; www.spectrum.ieee.org

SCIENCE & TECHNOLOGY INFORMATION

Strong Demand for Open-Access Science

A study, published in the Proceedings of the National Academy of Sciences (PNAS, Feb. 23, 2022), analyzed the reasons for 1.6 million downloads of National Academies of Sciences, Engineering, and Medicine (NASEM) consensus reports, considered among the highest credibility science-based literature. The resulting analysis, which included U.S. downloads only, is the first to look at who is using such information and why. Professor Diana Hicks, Assistant Professor Omar I. Asensio, and Ph.D. students Matteo Zullo and Ameet Doshi, all from Georgia Tech's School of Public Policy, co-authored the study. They found that while nearly half of the reports were downloaded for academic purposes, even more were accessed by people outside strictly educational settings, such as veterans, chaplains, and writers. The word "edification" appeared 3,700 times in the data set, signaling a strong desire for lifelong learning among users. "This study shows strong demand among everyday Americans for the highest quality information to help improve at their jobs, to help their relatives, neighbours, and communities, and in some cases simply to learn for learning's sake," said Hicks. The study emphatically shows that open access to scientific information matters to the average American, said co-author Ameet Doshi, a School of Public Policy Ph.D. student and the head of the Donald E. Stokes Library at Princeton University. "This research will, hopefully, raise awareness about the positive returns that accrue to society from investments in institutions that democratize public access to high-quality research," said Doshi, who for his dissertation is analyzing similar data on downloads from Harvard University's open-access portal.

February 24, 2022; www.phys.org

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

MEETING WITH SCOPE PRESIDENT

Dr. Amitava Bandopadhyay, DG, NAM S&T Centre met Prof. Jon Samseth, President, Scientific Committee on Problems of the Environment (SCOPE), Amstelveen, The Netherlands in Oslo, Norway on 24th March, 2022 and had detailed discussion on issues of mutual interest in regard to S&T collaboration in the areas of environment and sustainable development. NAM S&T Centre and SCOPE intend to sign a Memorandum of Understanding (MoU) and establish a collaborative relationship on the basis of commonality of interest and mutual understanding, especially to take up joint Scientific Programs including International Workshops/Seminars/Training Courses and scientific publications in areas of global concern, including environment, sustainable development and other related subjects from time to time.

It may be noted that the NAM S&T Centre in partnership with the JSS Academy of Higher Education and Research (JSS AHER), Mysuru, India and SCOPE had organized an International Workshop very successfully on "Gender Issues in Water Management in Developing Countries and Sustainable Development" during 22-23 February, 2022.

Prof. Samseth welcomed the idea of signing the MoU and indicated that the MoU signing may take place in September 2022 when a SCOPE Team is planning to visit India on the occasion of SCOPE EC Meeting and SCOPE India office inauguration ceremony. An International Seminar will also be organised by the JSS Academy of Higher Education and Research during this period in Mysuru, India.

In addition, Dr. Bandopadhyay and Prof. Samseth discussed the possibility of jointly organizing a Training Program in January/February 2023 on an environment related topic. The event would be organized in Virtual/Hybrid Mode.

Prof. Samseth and Dr. Bandopadhyay also discussed and agreed to the idea of publication of a Monograph on "Dynamics of Water-Food-Energy Interactions: Perspectives from Developing World" in partnership with the JSS Academy of Higher Education and Research, Mysuru. Dr. S. Suriyanarayanan, Deputy Director – Research, Vinayaka Mission's Research Foundation, Salem, India and Head, SCOPE India Office has agreed to serve as the Coordinating Editor for the Monograph.



MEETING WITH HIS EXCELLENCY AMBASSADOR OF THE REPUBLIC OF CUBA TO INDIA

Dr. Amitava Bandopadhyay, DG, NAM S&T Centre met HE Ambassador Mr. Alejandro Simancas Marin, Ambassador of the Republic of Cuba (In India/Bangladesh/Bhutan/Nepal) in the Embassy of the Republic of Cuba in New Delhi on 18th February, 2022 and had detailed discussion on issues of mutual interest. Dr. Bandopadhyay thanked HE Ambassador Marin for sparing his valuable time for the meeting and for the support of the Republic of Cuba in regard to the activities of the NAM S&T Centre. Dr. Bandopadhyay explained about various S&T activities of the Centre aimed at enhancing South-South Cooperation for the Member Countries and other developing countries. A copy of the 30th Anniversary Compendium titled "**In Pursuit of Science, Technology and Innovation – Three Decades of NAM S&T Centre**" and a few other publications were presented to HE Ambassador Marin during the meeting.

Dr. Bandopadhyay also sought the help of HE Ambassador so that NAM S&T Centre can organize an International Workshop in Cuba during 2023 and requested his help so that more Scientists, Technologists and Other S&T Professionals can participate in the activities of the NAM S&T Centre regularly. HE Ambassador Marin assured that he will discuss the possibilities with the Focal Point of the NAM S&T Centre in the Ministry in Cuba and will definitely facilitate the process. He also thanked Dr. Bandopadhyay and Mr. Sunil Kumar, Accounts Manager, NAM S&T Centre for their visit.

Dr. Bandopadhyay also took this opportunity to invite HE Ambassador for a visit to the NAM S&T Centre on a mutually convenient date. HE Ambassador Marin accepted the invitation.



Centre Announces

International Workshop on “DEVELOPMENT OF FOOD GREEN CITIES FOR URBAN SUSTAINABILITY”

Jointly with

Nepal Academy of Science and Technology (NAST), Nepal

April 26-27, 2022

[In Virtual-Mode]

Globally, the urban population is increasing rapidly and this population increase is expected to take place mainly in developing countries. It necessitates a proper planning and management for sustainable urban development. There is a huge growing demand of food supply for urban inhabitants due to the increasing trend of urbanization. Urban agriculture can play a valuable role in sustainable food systems with environmental, social, economic and health benefits. So the national and local governments need to become more strategic in responding to the challenges and opportunities posed by rapid urbanization by formulating a national urbanization strategy and better coordinated actions by all the stakeholders involved including the private sector.

The local production and use of seasonal foods help to meet the food demand of seasonal products in short supply chain and improve resource efficiency by decreasing the waste or loss of food produced for human consumption that will help to fulfill the Sustainable Development Goals (SDG 11) of cities and communities. For urban areas to produce food itself to some extent and maintain greenery, the concept of Food Green City (FGC) is realized i.e. by integrating urban agriculture with urban planning for addressing socio-economic and environmental issues. The food green city approaches are being realized using various methods of urban horticulture practices like utilizing barren lands of city gardens, parks, roadsides, roof tops and balconies along with modern soil less vertical farming like aquaponics, hydroponics and aeroponics. This kind of approach encourages entrepreneurship among the youths and beautifies the cities by conserving landscapes. Green spaces are also imperious for improving mental and physical health of the urban population.

Considering the importance to develop Food Green Cities combining urban agriculture and the land used in planning and management system along with solid waste management, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi jointly with the Nepal Academy of Science and Technology (NAST), Lalitpur, Nepal is organizing a two days International Workshop on '**Development of Food Green Cities for Urban Sustainability**' during **April 26-27, 2022**. The Workshop will be hosted by NAST and organized in **Virtual-Mode**.

Researchers, scientists, government officials, policy makers, managers and representatives from industry and non-government organizations from various developing countries and developed countries who are engaged in R&D, generation, promotion and policy making on urban agriculture, rapid urbanisation and related subjects are expected to participate in this Virtual-Workshop.

For further details, please contact the NAM S&T Centre (Email: namstcentre@gmail.com) or visit our Website: www.namstct.org.

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