



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 Director'S Desk

Warmest greetings to all our esteemed readers!!



The launch of the global initiative on 'Sustainable Energy for All (SE4All)' by the UN Secretary-General in 2011, aimed at doubling the rate of improvement in energy efficiency, doubling the share of renewable energy in the global energy mix and achieving universal energy access by the year 2030, prompted the Centre to organise its 3rd Triennial International Workshop on 'Sustainable Energy for All: Transforming Commitments to Action' in Bengaluru, India during 22-24 February 2014 jointly with the Society of Energy Engineers and Managers (SEEM), Trivandrum, India. 70 experts, professionals, administrators and researchers from 19 countries, besides an Observer from the International Renewable Energy Agency (IRENA), attended this highly successful event.

Another landmark contribution of the Centre was in the launch of the African Center for Lightning & Electromagnetics (ACLE) on 26th March 2014 during the International Symposium held in Entebbe, Uganda on a theme 'Preparing for Lightning Disaster across Africa: What is Possible, What is Next?' that was a follow up of the recommendations made at the African Regional Training Programme on Lightning Protection organised by the Centre in Kampala, Uganda in February last year. The launch of ACLE being hosted by Makerere University Business School (MUBS) in Uganda had the blessings of Hon. Eng. Hilary Onek (MP), Minister of Relief, Disaster Preparedness and Refugees and Hon. Prof. Tarsis Bazana Kabwegyere, Minister (General Duties) in the Office of the Prime Minister of Uganda.

The Centre's Research Training Fellowship for Developing Country Scientists (RTF-DCS) Scheme is successfully being executed in its 2nd year of implementation (2013-14) and 14 Fellows out of 20 researchers from 16 countries selected by an international high level selection committee have already joined their respective host institutions in India.

The Centre announces the organisation of an International Workshop on 'Perspectives on Science and Technology Diplomacy for Sustainable Development in NAM and Other Developing Countries' at Manesar (Haryana), India during 27-30 May 2014 with partial financial support from the Department of Science and Technology (DST), Government of India. I earnestly invite the concerned scientists and professionals to take part in knowledge sharing in this highly important subject.

I hope to see the productive months ahead and look forward to your active participation in our activities with constructive suggestions.

Happy Reading!


(Arun P. Kulshreshtha)

Centre Organised

International Workshop on Sustainable Energy for All: Transforming Commitments to Action Bengaluru, India, 22-24 February 2014

Sustainable energy - energy that is accessible, cleaner and more efficient – powers opportunity. It grows economies; lights up homes, schools and hospitals; empowers women and local communities; and paves a path out of poverty to greater prosperity for all. In short, it is meeting the needs of the present without compromising the needs of the future. The world currently invests more than \$1 trillion per year in energy, much of it going toward the energy systems of the past instead of building the clean energy economies of the future. Investing in sustainable energy is a smart strategy for growing markets, improving competitiveness, and providing greater equity and



Inauguration of Sustainable Energy Workshop, Bengaluru, India

(Contd. on page 2 col. 1)

African Center for Lightning & Electromagnetics (ACLE) Launched

The African Center for Lightning and Electromagnetics (ACLE) to be located at the Makerere University Business School (MUBS) in Uganda was launched on 26th March 2014 with the organisation of a two day International Symposium in Entebbe, Uganda on a theme 'Preparing for Lightning Disaster across Africa: What is Possible, What is Next?'

The NAM S&T Centre played a vital role in the establishment of ACLE which is the outgrowth of the international Lightning Protection roundtables organised by the Centre in Sri Lanka in May 2007 and Nepal in October 2011, as well as the African Regional Training Programme on Lightning Protection in Uganda in February 2013. The foundation of ACLE was spurred by the dedicated and untiring efforts of Mr. Richard Tushemereirwe, Senior Presidential Adviser for Science and Technology, State House, Uganda.

(Contd. on page 5)



(Contd. from Page 1 - Sustainable Energy Workshop, Bengaluru)

opportunity. The promise of renewable energy can only be realised through significant investments in research and development on alternative, sustainable technologies such as solar, biomass, wind, hydropower, geothermal power, ocean energy sources, solar-derived hydrogen fuel, and the energy storage technologies necessary to operate them competitively. Indeed, the transition to sustainable energy may well be the biggest business opportunity of the 21st century.

'Sustainable Energy for All (SE4All)' is a global initiative launched by the Secretary-General of the United Nations, Ban Ki-moon, in the year 2011. It is aimed at achieving energy access, improving energy efficiency and increasing the use of renewable energy. Under this initiative it is intended to double the rate of improvement in energy efficiency, double the share of renewable energy in the global energy mix, and achieve universal energy access by the year 2030.

In order to deliberate on variety of issues concerning the sustainable energy, 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), Trivandrum, India, and in association with the Christ University Faculty of Engineering, Bangalore, India organised the Third Triennial International Workshop on 'Sustainable Energy for All: Transforming Commitments to Action' in Bengaluru, Karnataka, India during 22-24 February 2014. Mangalore Refinery & Petrochemicals Limited, a subsidiary of the Indian Oil and Natural Gas Corporation Ltd. (ONGC), was the Principal Sponsor of this workshop. The State Designated Agencies (SDA) of the Bureau of Energy Efficiency (BEE) in Karnataka, the Karnataka Renewable Energy Development Limited (KREDL) and the Government of Karnataka undertaking Power Company of Karnataka Limited (PCKL) co-sponsored this event.

The Sustainable Energy Workshop opened in an Indian traditional way by a cultural dance performance, lighting of the lamp and singing the University anthem. Dr. Iven Jose, Associate Dean, Electronics and Communications Engineering, Christ University Kengeri Campus, Bengaluru welcomed the delegates. Giving the Presidential Address

Prof. Dr. Arun P. Kulshreshtha, Director & Executive Head, NAM S&T Centre presented the genesis of the event and also briefly described the activities of his inter-governmental organisation. This was followed by the address of Fr. Arun Anthony Chully, CMI, Director, Department of Management Studies, Christ University, Bengaluru. Inaugural Address was given by Mr. N. Suresh, General Manager, Karnataka Renewable Energy Development Limited, Bengaluru. After the Vote of Thanks by Dr. R. Harikumar, General Secretary, SEEM, a group photograph session was held outside the main building of the Kengeri Campus of Christ University.

70 experts, professionals, administrators and researchers from 19 countries including Australia, Denmark, Egypt, Indonesia, Iraq, Malaysia, Mauritius, Myanmar, Nigeria, The Philippines, Sri Lanka, Thailand, Turkey, USA, Vietnam, Zambia, Zimbabwe, and the host country India, of which 13 (underlined) were the member countries of the NAM S&T Centre, attended this international workshop. The International Renewable Energy Agency (IRENA) with its office in Abu Dhabi, UAE was represented as an Observer.

The overseas participants were from Australia [Mr. Stephen Phillips, Chairman and Managing Director, Optimal Power Solutions, Brunswick]; Denmark [Mr. Jyoti Prasad Painuly, Manager and Senior Energy Planner, SE4All Energy Efficiency Hub, UNEP Risoe Centre, Copenhagen]; Egypt [Prof. Moustafa Mohammed Eissa, Department of Electrical Engineering, Faculty of Engineering, Helwan University, Cairo; and Dr. Gamal Abd El Latif Abd El Latif Haggag, Engineering Consultant, Technical Affairs and Cooperation with External Actors, Egyptian Electricity Transmission Company, Cairo]; Indonesia [Dr. Soni Solistia Wirawan, Head of Energy Technology Center, Agency for the Assessment and Application of Technology, Balai Besar Teknologi Energi (BPPT), Puspiptek]; Iraq [Mr. Mudher Hani Mahmood, Engineer, Renewable Energy/Hydrogen & Biofuel Department, Ministry of Science & Technology, Baghdad]; Malaysia [Dr. Mohd Nor Azman bin Hassan, Senior Principal Assistant Secretary, Ministry of Science & Technology Innovation (MOSTI), Putrajaya]; Mauritius [Mr. Vishwamitra Oree, Lecturer, Department of Electrical and Electronic



Group Photo during Inauguration of Sustainable Energy Workshop, Bengaluru, India



(Contd. from Page 2 - Sustainable Energy Workshop, Bengaluru)



Ms. Subhashree Basu, Research Assistant attended the event.

8 expert talks and 18 technical papers, status reports and case studies (total 26) were presented in seven technical sessions co-chaired by Prof. Moustafa Mohammed Eissa (Egypt), Dr. Soni Solistia Wirawan (Indonesia), Dr. Mohd. Nor Azman bin Hassan (Malaysia), Dr. Ezekiel Ayinde Alani (Nigeria), Mr. Bernardo Tandang Caringal (The Philippines), Mr. Warnage Ransisi Keerthi Fonseka (Sri Lanka), Dr. Selçuk Atas, Tübitak Marmara Res. Center, Gebze (Turkey), Mr. Ngonidzashe Givemore Dupwa (Zimbabwe), and Mr. C. Jayaraman (Chairman, SEEM, Kerala Chapter), Dr. P. Das (Professor, Faculty of Engineering, Christ University), Dr. P. Jayakumar (CEO, Arbutus Consultants Pvt. Ltd., Pune), Dr. V Shankar (Professor, Faculty of Engineering, Christ University) and Mr. R. Sudhir Kumar (Editor – Energy Snippets, SEEM, Bengaluru), all from India.

During the technical sessions, expert talks were delivered by eminent experts and professionals on 'Renewable Mini Grid Systems for Remote Area Electrification' by Mr. Stephen Phillips of Australia; 'SE4ALL Energy Efficiency Hub' by Mr. Jyoti Prasad Painuly of Denmark; 'USAID initiatives on SE4All' by Mr. Anurag Mishra [Sr. Clean Energy Specialist, U.S. Agency for International Development (USAID), India; 'National Initiatives and Low Carbon Growth Policy Options for India' by Dr. S.S. Krishnan, Head, Energy Efficiency and Sustainable Energy Policy Program, Center for Study of Science, Technology and Policy, Bengaluru; 'SPV systems' by Mr. Revankar, Chief Executive Officer, EMMVEE Solar, Bengaluru; 'Sustainable Solar Energy in India' by Mr. Rajeshwara Bhat, Managing Director, Juwi India Renewable Energies Pvt Ltd., Bengaluru; 'Consultant's Role in enhancing Investor's Value in MW Level Solar PV Power Plants' by Dr. P. Jayakumar, CEO, Arbutus Consultants Pvt. Ltd., Pune, India; and 'Rethinking Financing and Business Approaches to Energy Access' by Dr. Binu Parthan, Principal at Sustainable Energy Associates, India

Engineering, University of Mauritius, Reduit]; Myanmar [Dr. Myo Myint, Associate Professor, Department of Electronic Engineering and Information Technology, Technological University, Yangon]; Nigeria [Dr. Ezekiel Ayinde Alani, Senior Lecturer, Department of Agricultural Economics, Ladole Akintole University of Technology, Ogbomosho]; The Philippines [Mr. Bernardo Tandang Caringal, Provincial Science and Technology Director, DOST-MIMAROPA, Taguig City]; Sri Lanka [Mr. Warnage Ransisi Keerthi Fonseka, Principal Research Engineer, Industrial Technology Institute, Colombo]; Thailand [Mr. Boonchu Leelakajohnjit and Mr. Sriwichai Susuk, Thailand Institute of Scientific and Technological Research (TISTR), Pathumthani]; Turkey [Dr. Selçuk Atas, Researcher, Tübitak Marmara Research Center, Gebze]; UAE [Mr. Divyam Nagpal, Joint Professional Associate – KPFC, International Renewable Energy Agency (IRENA), Abu Dhabi]; USA [Mr. Anurag Mishra, Senior Clean Energy Specialist, Clean Energy and Environment Office, U.S. Agency for International Development (USAID), American Embassy, New Delhi, India]; Vietnam [Dr. Nguyen Anh Tuan, Officer, Department of International Cooperation, Ministry of Science and Technology (MOST), Hanoi]; Zambia [Ms. Kutemba Kaina Kapanji-Kakoma, Scientific Officer, National Institute for Scientific and Industrial Research (NISIR), Lusaka]; and Zimbabwe [Mr. Ngonidzashe Givemore Dupwa, Science and Technology Officer and Mr. Caleb Mharapara, Deputy Director of University Education, Ministry of Higher and Tertiary Education, Science and Technology Development, Harare]. From the NAM S&T Centre, Prof. Arun P. Kulshreshtha, Director & Executive Head; Mr. M. Bandyopadhyay, Senior Expert & Administrative Officer; and

The presentations made by the participants were on 'Monitoring and Novel Applications of 220kV/500kV Egyptian Grid Parameters using Family of PMU based WAMS' by Prof. Moustafa Mohammed Eissa of Egypt; 'Renewable Energy in Egypt (Challenges and Ambition)' by Dr. Gamal Abd El Latif Abd El Latif Haggag of Egypt; 'Biofuels - An Alternative Energy Source towards a Sustainable and Eco-Friendly future: The Indian Scenario' by Ms. Subhashree Basu of India; 'Renewable and Conservation Energy Development Program in Indonesia' by Dr. Soni Solistia Wirawan of Indonesia; 'Portable Solar Anaerobic Digestion Pilot Plant for Biogas Production' by Mr. Mudher Hani Mahmood of Iraq; 'Pre-Commercialization of Research and Development Projects to improve Renewable Energy Technologies in Malaysia: The Technological, Institutional and Market Challenges' by Dr. Mohd Nor Azman bin Hassan of Malaysia; 'Transforming Sustainable Energy Commitments into Actions in Mauritius'



(Contd. from Page 3 - Sustainable Energy Workshop, Bengaluru)



Institute For Scientific And Industrial Research' by Ms. Kutemba Kaina Kapanji of Zambia; 'Technology Transfer in the Area of Alternative Energy, Why Zimbabwe remained bogged in Load Shedding: A Case Study of Photovoltaic GEF Project Zimbabwe' by Mr. Ngonidzashe Givemore Dupwa of Zimbabwe; 'Alternative Energy Utilization by Institutions of Higher Learning: and A Case Study of Zimbabwe' by Mr. Caleb Mharapara of Zimbabwe;

In the Concluding Session, co-chaired by Mr. C Jayaraman, Chairman, SEEM Kerala Chapter; Dr. Ezekiel Ayinde Alani, Senior Lecturer, Ladoko Akintola University of Technology, Nigeria; Prof. Dr. Arun P. Kulshreshtha, Director & Executive Head, NAM S&T Centre; and Dr. R. Harikumar, General Secretary, SEEM Kerala, Prof. Arun Kulshreshtha made a presentation on 'The Role of the NAM S&T Centre for South – South Cooperation in Science & Technology'. Subsequently, there was considerable discussion and debate to generate a set of recommendations titled 'Bengaluru Declaration on Sustainable Energy for All', which was subsequently unanimously adopted in the presence of Fr. Thomas T.V., Director, Institute of Management, Christ University, Bangalore. Fr. Thomas also handed over the Participation Certificates to the participants and gave the Valedictory address.

Later, the participants were taken on a field visit to Promptec Renewable Energy Solutions Pvt. Ltd. in Bangalore, an LED Lamp Manufacturing Factory, and sightseeing / shopping.

Ms. Kutemba Kaina Kapanji - Kakoma of Zambia and Prof. Moustafa Mohammed Eissa of Egypt thanked the organisers on behalf of the participants for the successful and fruitful organisation of the Workshop and for excellent hospitality and arrangements made for the delegates. The role of student volunteers was specifically applauded. It was unanimously hoped that more similar events will be held in future with a focus on South-South cooperation.

Bengaluru Declaration

ON SUSTAINABLE ENERGY FOR ALL

WHILE EXPRESSING deep gratitude to the Society of Energy Engineers and Managers (SEEM) and the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) for organising the 3rd Triennial International Workshop on 'Sustainable Energy for All: Transforming Commitments to Action', which was held at Bengaluru, India during 22-24 February 2014, as well as to Christ University Faculty of Engineering in Bengaluru for being the gracious host of the event;

HAVING BEEN CONVINCED that the annual global energy sector investments of more than US\$1 trillion, much of it going towards traditional and high-carbon energy systems can be directed towards building the clean energy economies of the future, the world needs transition from its current unsustainable energy paradigm to a future substantially complemented by renewable energy sources with high levels of resource efficiency, thus requiring sustainable energy technologies to play a key role in reducing the world's dependence on non-sustainable, fossil-based energy sources;

BY SHARING the experiences in Non Aligned and other developing countries and showcasing country experiences in ensuring universal access to modern energy services, improving energy efficiency and increasing the share of renewable energy in the energy mix;

RECOGNISING that the expansion of sustainable energy technologies such as solar, biomass, wind, hydro, geothermal, ocean resources, low-carbon transportation and the energy storage technologies will make a substantial contribution in reducing the environmental and cost burdens associated with conventional energy supplies, also leading to a decline in the use of fossil fuels and greenhouse gas emissions associated with climate change;

REALISING that the investment in sustainable energy is a smart strategy for growing markets in developing countries, improving competitiveness, increasing energy security and providing greater equity and opportunity,

THE PARTICIPANTS FROM AUSTRALIA, EGYPT, INDIA, INDONESIA, IRAQ, MALAYSIA, MAURITIUS, MYANMAR, NIGERIA, THE PHILIPPINES, SRI LANKA, THAILAND, TURKEY, VIETNAM, ZAMBIA AND ZIMBABWE EXPRESS BELIEF that the deliberations of the workshop on 'Sustainable Energy for All 2014' were a success in sharing of knowledge, facilitating South-South and North-South knowledge transfer, at the end of which the following recommendations were made, including some



(Contd. from Page 4 - Sustainable Energy Workshop, Bengaluru)

action items, for adoption by the participating countries in formulating their policies and action plans to improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources for sustainable development, and

UNANIMOUSLY RESOLVE that all developing countries are strongly encouraged to:

- Exhibit a strong political commitment, endorse the 'Sustainable Energy for All' vision, and develop unilateral, bilateral, multilateral and regional action plans to ensure universal energy access, enhancing energy efficiency and scaling-up renewable energy;
- Identify existing gaps in policy, regulatory framework and technology arena and accordingly develop appropriate schemes to promote renewable energy, energy efficiency and energy access;
- Develop suitable protocols for energy auditing and benchmarking 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 increase electricity 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;
- 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, agriculture et cetera, while developing policies, regulations and financing mechanisms for clean energy services due to its across-the-board impact;
- Keep the interplay between energy security and food security in mind since the issue of energy security compromising the capability of countries to meet their food needs has come up as an emerging concern leading to a definite shift from first-generation biofuels based on food crops to next-generation biofuels made from inedible feedstock;
- Promote participation of business and financing establishments in sustainable energy programmes, considering the need to scale up the level of action and investment;
- Engage civil society organisations and NGOs and empower beneficiary communities especially women and youth, given the extent of action and advocacy needed;
- Educate all stakeholders to practice energy modesty and use energy rationally in the context of the energy rebound effect;
- 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 sustainable energy systems.

This declaration calls upon governments, business and civil society to reiterate their obligation to promote a healthy society that encourages the wellbeing of all people and ensures a clean, green, safe planet to our coming generations.

Participants appreciated the proposal from SEEM to establish a joint Fellowship scheme on Sustainable Energy with the NAM S&T Centre, subject to necessary approvals and availability of funds.

THUS RESOLVED AND ADOPTED ON THE 24TH FEBRUARY 2014 AT BENGALURU, INDIA.

(Contd. from Page 1 - ACLE Launched, Uganda)

African Center for Lightning & Electromagnetics (ACLE) Launched

ACLE Symposium was formally inaugurated on 25th March 2014 by H.E. Professor Tarsis Bazana Kabwegyere, Honourable Minister (General Duties) in the Office of the Prime Minister of Uganda.

The event was attended by the specialists and professionals from Burundi [Mr. Edouard Nibigira, President of the National Platform for Risk and Disaster Management and General Director, Civil Protection], Egypt [Eng. Magdy Abd Alalim, Egyptian Group], Guinea [Mr. Mamadou Tounkara, National Directorate of Meteorology, Conakry], India [Prof. Dr. Udaya Kumar, High Voltage Laboratory, Department of Electrical Engg., Indian Institute of Science, Bengaluru], Malaysia [Prof. Chandima Gomes, Head, Centre for Electromagnetic and Lightning Protection Research (CELP), Universiti Putra Malaysia and Mr. Steve Rao, Advisor Special Projects, Consulate of Uganda in Malaysia], Nigeria [Mr. Babagana Abubakar, Vice President KDA and Technical Expert Climate Change Ecowas Wawa Secretariat]; Senegal [Mr. Ngamini Jean Blaise, Responsible for Meteorological Network in the Agency for the Safety of Air Navigation in Africa and Madagascar (ASECNA)], South Africa [Mr. Ian McKechnie, Director, INNOPRO and Ms. Hilary Phillips, Technical & Industrial Journalist], USA [Dr. Mary Ann Cooper, Professor Emerita, Department of Emergency Medicine, University of Illinois at Chicago] and Zambia [Mrs. Foster Chileshe Lubasi, Formerly, Head, Materials Engineering and Technical Services, National Institute for Scientific and Industrial Research (NISIR), Lusaka and



Group Photo during Inauguration of ACLE Symposium, Entebbe, Uganda



(Contd. from Page 5 - ACLE Launched, Uganda)

Mr. Silumelume Nyambe, Zambia Air Services Training Institute, Lusaka], Earth Networks [Mr. Jim Anderson, VP International and Mr. Ari Davidov, Director, International Business Development], NAM S&T Centre [Prof. Dr. Arun P. Kulshreshtha, Director & Executive Head and Mr. M. Bandyopadhyay Senior Expert], and the host country Uganda [Prof. Waswa Balunywa, Principal, Makerere University Business School, Kampala; Mr. Richard Tushemereirwe, Senior Presidential Adviser for Science and Technology to H.E. the President of the Republic of Uganda; Dr. Edmund Ataremwa, Head ACLE; Dr. Ismail N. Burugahara, Assistant Executive Secretary, Uganda National Council for S&T (UNCST); Mr. Eza John, Uganda National Meteorological Authority, National Meteorological Centre; Mr. Muwembe Khalid, Sen. Meteorologist, Uganda Meteorological Department; Ms. Harriet Nalugya, Standards & Specifications Engineer, Uganda Electricity Transmission Company Ltd.; Ms. Suzan Prima, Directorate of Ethics and Integrity, Office of the President; Mr. Charles Olupot, Makerere University Business School, Kampala; Mr. Patrick Kibaya, Projects Officer, Uganda Chartered Healthnet; and others], most of whom presented papers during the Symposium. There was also a Skype presentation by Dr. Shreeharsh Mallick of the International Center for Lightning Research and Testing (ICLRT), Florida, USA on the basics of lightning detection methods. The presentations of the NAM S&T Centre were on 'The Role of NAM S&T Centre in the Emergence of ACLE' by Prof Arun P. Kulshreshtha and on 'Institutions - Industry Collaboration as a Public-Private Partnership Mechanism: The Indian Scenario' by Mr. M. Bandyopadhyay.

The deliberations of the Symposium concluded with the adoption of a set of recommendations on ultra-short term, short term and long term plans for the ACLE. It was also recommended that ACLE should explore suitable collaboration arrangements with private sector companies with expertise on lightning protection and related areas as well as training opportunities at universities with established lightning research centres.

H.E. Engineer Hilary Onok (MP), Honourable Minister of Relief, Disaster Preparedness and Refugees of Uganda made the formal announcement of the establishment of ACLE during the Concluding Ceremony of the Symposium hosted by a U.S. based lightning instrumentation company, M/S Earth Networks, on 26th March in the presence of Prof. Robert Odok Ocheng, Commissioner Higher Education, Prof. Waswa Balunywa, Principal, Makerere University Business School, Kampala and Symposium participants.

NAM S&T Centre – ZMT Bremen Fellowship Research Project Completion Reports

Kenya - Project Completion Report of Mr. Gideon Mbithi Kivengea



Mr. Gideon Mbithi Kivengea, Assistant Director of Research, State Department of Science and Technology, Ministry of Education Science and Technology in Kenya was awarded a Fellowship by the NAM S&T Centre under its Joint NAM S&T Centre–ZMT Bremen Fellowship Scheme to carry out research work at the Leibniz Center for Tropical Marine Ecology (ZMT), Bremen, Germany during 18th August to 15th November 2013 on a project titled 'Estimating Abundance of Kenyan Marine Fishes 2012' under the supervision of Dr. Werner Ekau.

During his research work he observed that though Kenyan marine catches have shown some gradual increase over the last two decades, there is still lack of adequate information on the fish stocks. For the estimation of abundance of Kenyan marine catches landed in 2012 he collected raw data from the State Department of Fisheries. The Catch per Unit Effort (CPUE) was used as index of relative abundance. The average number of fishing crew using a specific fishing gear was taken as the measure of total fishing effort. The research results conclude that the six major types of fishing vessels were mainly in use along the Kenyan coast: Dau, Dugout, Hori, Mashua, Mtori and Ngalawa. The fishing vessel's size lengths varied between 2 to 23 m. The average number of fishing crew increased with increase in vessel length. Lamu and Mombasa districts recorded the highest number of fish species groups with the highest CPUE.

Vietnam - Project Completion Report of Mr. Le Huu Cuong



Mr. Le Huu Cuong, Researcher, Experimental Biology Laboratory, Institute of Natural Products Chemistry (INPC), Vietnam Academy of Science and Technology (VAS) in Hanoi, Vietnam was awarded a Fellowship by the NAM S&T Centre under its Joint NAM S&T Centre–ZMT Bremen Fellowship Scheme to carry out research work at the Leibniz Center for Tropical Marine Ecology (ZMT), Bremen, Germany during 26th November 2013 to 23rd February 2014 on a project titled 'Cytotoxicity of Filamentous Fungus isolated from *Spongilla* sp. and the Identification of Uncultured, Associated Fungi' under the supervision of Dr. Astrid Gärde.

During his research a sample of *Spongilla* sp. collected in Hai-Phong coastal area of Vietnam was used for isolation and detection of endophytic fungi. Only one fungus was isolated. Ethyl acetate extract of combined mycelia and cultured broth of this fungus was tested for cytotoxicity against human cell lines (Hep-G2 and RD). The extract showed an inhibition against Hep-G2 and RD cell with IC₅₀ values of 25 µl/mL and 85 µl/mL respectively. The fungal isolate was placed within the genus *Phaeosphaeriopsis* based on high identities (99-100%) between this fungus ITS (500 bp) sequence with ITS of other known members of the genus *Phaeosphaeriopsis*. PCR amplification of ITS region using primers ITS1, ITS4 and total DNA extracted from sponge material as template resulted in two dominant DNA bands with length of 520 and 780 bp, and their sequence indicated the presence of uncultured fungal species of *Thelebolades* and *Dysidea* genus in the *Spongilla* sp. However, his fungal isolate was not detected using PCR method, suggesting the much less abundance of this fungus.



SCIENCE AND TECHNOLOGY NEWS IN THE DEVELOPING WORLD

Africa: Prawns in Parasite Control

Reintroducing prawns to lakes and rivers in which they have been partially or fully lost may be a sustainable way of controlling the parasitic disease schistosomiasis, which kills more than 200,000 people every year in Sub-Saharan Africa alone. Researchers have found some native prawns to be voracious predators of the freshwater snails that transmit schistosomiasis parasites and so could be used as a biological control. Field tests under way in Senegal suggest that farming the edible prawns could help local populations cut disease while also providing an additional source of income. Prawns may offer a simple and affordable transmission control solution in rural poor communities where few alternatives exist and drug treatment is failing to achieve long-term disease reductions. People get infected from contact with water containing schistosomiasis parasites, which are released by infected snails. Although people who carry schistosomiasis can be treated with the drug praziquantel, re-infection from fresh exposure to infested waters hampers disease control and eradication. In lab experiments, measurement of the rate at which prawns eat uninfected snails showed that prawns consume an average of 12 per cent of their body weight in uninfected snails each day. Young prawns that are still growing are more efficient at controlling snail numbers than large, fully-grown prawns. The larger prawns ate more snails but the smaller ones were more efficient as they ate more snails per gram of body weight and fed on snail eggs and hatchlings, too. These results support the idea of the aquaculture of native prawns, and their reintroduction to freshwater bodies where their numbers have fallen. When prawns are too small to be sold at market they are 'high-efficiency snail killers'. When they grow and their efficiency declines, one can harvest them. It can be a win-win solution. One can have a prawn aquaculture programme that supports public health efforts by reducing snail populations and also boosts the local economy because prawns are more valuable on most markets than fish. Tests on two native prawn species, from Cameroon and from Malaysia, against two snail species that transmit schistosomiasis in Africa and Latin America showed that both species of prawns fed on these snails. The researchers have already taken their experiment to field settings to see if the prawns can help curb the disease's transmission from snails to people through water. Over the past few years, researchers have added prawns to net enclosures built alongside the river in Lamparas village, Senegal, and are monitoring re-infection in local people treated with praziquantel. They plan to expand this field trial, named *Projet-Crevette*, to two more villages later this year. The next step is to compare prawns' consumption of infected versus uninfected snails in lab experiments.

Source: SciDev.Net, 20th January 2014

Benin: Anti-meningitis Vaccines endure African Temperatures without Damage

As biological products, almost all vaccines are sensitive to damage from excessive warming or freezing. National regulatory authorities and the World Health Organization (WHO) license them exclusively for use under conditions where they are stored and distributed between 2°C and 8°C, the so-called cold chain. But many vaccines are actually thermostable outside that range, and some newer ones in particular can often remain viable for days, weeks or even months after exposure to higher temperatures. This has prompted interest in a 'controlled temperature chain' (CTC) that would allow vaccines to be stored for short periods at higher temperatures for the 'last mile' of distribution, something that would be especially helpful in hot developing countries where electricity and refrigeration is lacking. The anti-meningitis campaign, carried out in Benin in December 2012 by the country's health ministry and researchers from the WHO and PATH, a non-profit body based in Seattle, Washington, tested delivering a vaccine against deadly meningococcal meningitis A that was stored at temperatures of up to 40 °C for up to four days. The findings mark an unequivocal success, with only 9 of the more than 15,000 vials needing to be discarded, none of them for heat damage. In the Benin trial, health workers delivered MenAfriVac, the first vaccine to get licensing approval for CTC distribution, to more than 155,000 people in 150 villages just using coolers similar to picnic boxes, with no ice. All vials carried stickers that measured the cumulative heat exposure over time and changed colour when a vaccine needed to be discarded. As an extra precaution, the researchers placed inside each cooler a card that changed colour if the peak temperature ever exceeded 40 °C. The results were striking: of the 15,000 vials of vaccine, each of which held 10 doses, none had

to be discarded because the stickers or cards indicated that they had exceeded their heat limits. The only vials that had to be thrown out had been stored at room temperature for longer than the approved four days. The findings mean that countries planning MenAfriVac campaigns can consider using CTCs with the blessing of regulators and the WHO. Researchers are careful to emphasise, however, that not all vaccines will be amenable to the practice and each vaccine has its own thermostability and therefore will require its own protocols. In many countries where the cold chain is critical and can be a challenge, this new innovative approach could be a game changer.

Source: Nature News Alert, 18th February 2014

Bolivia: The Latest Nuclear Power Newcomer

The landlocked South American country Bolivia, where about 23% of the country's population lacks access to electricity, including nearly 40% of rural dwellers, is the latest to join the nuclear newcomers' club, as developing nations and others look to secure a steady power source that is light on global warming-inducing CO₂. Like wind and solar, the nuclear electricity generating process does not emit CO₂, and it emits very little over its cradle-to-grave lifetime including mining and reactor retirement. Its CO₂ footprint is less than solar's and on a par with wind, two renewable sources that cannot generate around-the-clock like nuclear can, and that require far more land. Bolivia has a total generating capacity of 1.66 gigawatts, only slightly more than a single large nuclear reactor, and low for its population of 10.5 million people. It generates about 60 percent from fossil fuels - primarily natural gas, of which it has significant reserves - and 40 percent from hydro. It is a key exporter of natural gas to other South American countries including Brazil and Argentina. Known for its mining industry, Bolivia has significant reserves of lithium, a metal that features in the fluid designs of some molten salt reactors, and that also serves as an acidity balancing agent in conventional reactors. The nuclear agenda of Bolivia will include electricity generation as well as medical technologies, water management, and mining. Bolivia would consider developing nuclear power that departs from the conventional reactors of the last 50 years, and move toward alternative technologies that are safer, more efficient and potentially less costly, produce less long lived waste, and make it more difficult to fashion bombs. Around this time last year, some 45 countries were either planning or considering turning to nuclear for the first time, and industry forecasters were predicting a 30 percent growth in nuclear electricity generation by 2020. First timers include Saudi Arabia, the United Arab Emirates, Egypt, Poland, Vietnam, Bangladesh and Turkey, in partnerships with countries including Russia, China and South Korea. Two other would-be newcomers, Indonesia and Chile, are considering newfangled thorium-fuelled reactors to provide electricity and to desalinate water.

Source: SmartPlanet, 19th February 2014

Brazil: Healthier Beef

Beef has long been considered the antithesis of a healthy diet because of its high saturated fatty acid and cholesterol contents. Researchers from the School of Zootechny and Food Engineering (FZEA) at the Universidade de São Paulo (USP) Pirassununga Campus have now developed beef enriched with vitamin E, selenium and canola oil and less cholesterol.

The research showed that supplementing Nelore bull rations with high levels of organic selenium during a three-month fattening period not increased the quantity of selenium in the blood of these animals, the level of this mineral in the meat produced was almost six-times greater than that found in beef that did not have supplemented rations. The cholesterol level in the blood and meat of the animals that were given high-selenium feed was also significantly reduced. The laboratory and statistical analyses of the blood and meat samples indicated that the increased quantity of selenium in the diet caused alterations in the levels of oxidized glutathione (GSSG) and reduced glutathione (GSH). These enzymes inhibit the action of the enzyme responsible for cholesterol synthesis: HMG-CoA reductase. The mineral causes an increase in the quantity of GSSG and a decrease in GSH, causing a reduction in cholesterol owing to the action of HMG-CoA reductase. One of the possible explanations for these changes in the cholesterol level in the blood and meat of the animals that were given selenium supplements is that the mineral is part of glutathione peroxidase (GPx), an enzyme that is very similar to HMG-CoA reductase. Upon contact, selenium transforms GSH into GSSG, reducing the quantity of substrates for HMG-CoA reductase. In another FAPESP-funded study,

(Contd. on Page 8)



(Contd. from Page 7 - S&T News)

it was already proven that copper has the capacity to reduce cholesterol levels in the blood and meat of bovine cattle, but the mechanism through which copper does this is different. It alters the metabolism in the animal's rumen. To evaluate whether ingesting the meat of the animals that were given rations supplemented with selenium also caused an increase in the availability of the mineral and a reduction in cholesterol of humans, researchers conducted a study with elderly people in an assisted living facility in Leme, São Paulo State. The group of elderly individuals was chosen to participate in the study because they have lower immunity and anaemia in general owing to iron and protein deficiencies. An analysis of blood samples of this elderly population indicated that there was also an increase in selenium in the blood plasma after 45 days of consuming the meat. The analysis of the cholesterol levels in the blood samples of elderly people who consumed the meat has not yet been concluded, but it is seen that there has been an increase in the availability of vitamin E and selenium in the blood of those who consumed the meat for more than 45 days. In a previous study, also conducted with FAPESP funding, researchers added sunflower, selenium and vitamin E supplements to the rations to increase the availability of the mineral in the milk produced by the animals. The enriched milk was given to children from 1st through 4th grade who studied full-time at Escola Professora Stela Stefanini Bacci in Casa Branca, São Paulo. The results of the analysis showed that in addition to offering health benefits for cows and increasing milk production, enriched feed improved product conservation and increased the selenium and vitamin E levels in the blood of children who drank it. These two studies, namely, enrichment of bovine milk and meat through feed supplements, are the first of their kind worldwide because they associate zootechny and animal nutrition with human health. According to the researcher, vitamin E was combined with selenium in the supplementation of beef rations because of their complementary antioxidant effects. In addition to reducing cholesterol, the addition of the two antioxidant compounds to bovine rations also reduced the oxidation of the meat's fat, according to the results of oxidation analyses using a method known as TBARs. By reducing the product's oxidation time, selenium and vitamin E in the bovine rations could contribute to increasing the meat's shelf life. Further, less oxidized meat, with less fat, also has better flavour. The addition of canola oil to bovine rations with selenium and vitamin E, on the other hand, aims to improve the lipid profile of the meat by increasing the quantity of saturated fatty acids, which are the most harmful to human health. Utilising canola oil with the two antioxidant compounds – selenium and vitamin E – prevents the increased fat from altering the product's flavour.

Source: Agência FAPESP, 12th February 2012

China: High Yielding Salt Resistant Rice

Scientists from Hainan University and Hunan Provincial Academy of Agricultural Sciences developed high yielding salt resistant rice which could give an output of six tonnes per hectare. They planted 18 varieties in 3mu (0.2 hectare) in eastern Jiangsu province and after the harvest in October, one variety exhibited similar output as varieties growing in normal farmland. The progress marks a big breakthrough in the experiment because the varieties were planted in real saline-alkali soils rather than in laboratory. The experimental plantation will be expanded this year to 100mu to further evaluate the performance of the salt resistant rice varieties.

Source: Crop Biotech Update, 8th January 2014

India: Nanocomposite Films as Food Wrappers

Studies have shown that the cellulose-derived polymer absorbs water, making it unsuitable for protecting food from moisture. In addition, other studies have found that some chemicals in food-packaging materials seep into food. To develop moisture-resistant films with good mechanical properties, the researchers of the Defence Food Research Laboratory, Siddharthanagar, and Sri Jayachamarajendra College of Engineering, Mysore, India synthesised the nanocomposite by mixing bacterial cellulose nanocrystals and silver nanoparticles with hydroxypropyl methyl cellulose, a cellulose-derived polymer and then produced films of this nanocomposite. They observed aggregations of bacterial cellulose nanocrystals; these aggregations formed percolated networks throughout the nanocomposite. This structure enhanced the mechanical properties of the nanocomposite films, including their load-bearing capacity. The silver nanoparticles interacted with the

hydroxyl groups of the cellulose-derived polymer, improving the tensile strength and elongation properties of the films. The silver nanoparticles also enhanced the ductility of the films. Both the bacterial cellulose nanocrystals and the silver nanoparticles reduced the moisture intake of the films through blocking interactions between water molecules and the water-loving polymer. These films, which contain two nanomaterials, are expected to be very useful for developing ecofriendly food-packaging materials including potential biomedical applications.

Source: Nature India, 12th March 2014

Kenya: Turning Human Waste into Valuable Byproducts

About 2.5 billion people around the world lack of access to proper sanitation. Nearly 4 billion people are affected if you consider how waste ends up in waterways used for drinking or leached into soil. In communities that lack modern sanitation systems, proper infrastructure could help turn human waste into a valuable commodity. MIT spinout Sanergy has developed a model that impacts the entire 'sanitation value chain'. Waste is collected, stored, and recycled into useful products, such as fertiliser, creating work and renewable resources in Mukuru, a 500,000-person Kenyan slum where people often defecate in pits, and sometimes in the streets. Here, Sanergy manufactures low-cost, concrete-housed bathrooms called Fresh Life Toilets, which are franchised to local micro-entrepreneurs to run as Fresh Life Operators. Each toilet comes equipped with two removable, airtight waste cartridges - one for liquid waste and the other for solid waste - as well as conveniences like a trashcan, a sealed bin for sanitary pads, and a solar lantern. People can use them on an unlimited basis by purchasing a membership for about \$1 a month. Franchisees collect the money and can earn extra from selling hygiene-related products, such as toilet paper and soap. Sanergy collects and transports the waste to a processing facility, where it is composted with sawdust and microorganisms, converting collected waste into organic fertiliser. That is then sold to local farmers, who used to rely on more expensive, imported fertiliser. Each of these toilets costs about \$600, which includes construction, waste collection, and business and other support from Sanergy. Partnerships with financial organizations allow the startup to provide zero-interest loans to vetted operators. Since opening its first toilet for business in 2011, Sanergy has erected 330 toilets, with about 25 new ones added monthly, removing roughly 1,800 tons of waste. More than 350 jobs have been created in Mukuru: about 170 franchisees, as well people who construct and service the toilets and provide business support to the operators. The start-up recently purchased new tech that expedites the waste-to-fertiliser process, and they also hope to convert the waste into other useful byproducts soon, such as biogas and biochar (a type of charcoal). Within a few years, Sanergy hopes to spread operations across Kenya, the rest of Africa, and eventually South Asia and East Asia.

Source: SmartPlanet Daily, 12th February 2014

Madagascar: SME of Organic Farming with Bat Excrement, Guano

According to the World Food Programme (WFO) the chronic malnutrition rate in Madagascar is the sixth-highest in the world. Poor weather conditions have left four million Madagascans without food this year and if conditions don't improve, the WFO estimates another nine million people will face the same fate. A young entrepreneur has introduced a bat poo fertiliser company Guanomad, which collects bat excrement, called guano, and sells it as organic fertiliser. In the company's first year of business, it sold 400 tons of compost. Two years later it was producing over 13,000 tons of fertiliser. Today, this small and unlikely winner in the rising global interest in organic farming owns 120 caves holding roughly 350,000 to 400,000 tons of guano in southern Madagascar, and it exports to Europe, Canada, and the Caribbean islands. Last year, it was the surprise winner at last year's Africa Awards for Entrepreneurship (AAE), one of the continent's most prestigious business awards. This product has succeeded because it's 100 percent environmentally friendly, the 'manufacturing' cost involving the collection, packaging and distribution is a tenth of other fertilisers, and bat poo yields amazing results for farmers. But the main stand out quality that sets this product apart is that it is cheap. Most countries like Nigeria, South Africa and Egypt produce fertiliser from natural gas and then go through a lengthy and expensive process to produce 'industry standard' fertiliser. This process is 10 times the cost of Guanomad.

Source: SmartPlanet Weekly, 11th January 2014



Research Training Fellowship for Developing Country Scientists (RTF-DCS) 2012-13

Research Project Completion Reports

Ethiopia - Project Completion Report of Mr. Balewgize A. Zeru



Mr. Balewgize A. Zeru, Lecturer of Mechanical Engineering, Jimma Institute of Technology, Jimma University in Ethiopia was deputed by the NAM S&T Centre to Central Mechanical Engineering Research Institute (CMERI) Durgapur, West Bengal, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 during 18th March to 6th September 2013 to carry out research work on a project titled 'Carbon Nano Tubes as a Nano-fluid for Thermal Performance Improvement of Flat Plate Heat Pipe for High Density Heat Spreader' under the supervision of Dr. Sudip K. Samanta, Principal Scientist and Dr. Gautam Biswas, Professor of Mechanical Engineering.

His experimental work concentrated on the ideas of optimising two core research investigations outputs on two phase heat and mass transfer; the amount of nanofluid concentration in heat pipes and thickness of nano-layer on wick surfaces for best performance heat pipe applications. Coupling optimum concentration of nanofluids with decreasing the nano-layer thickness leads higher permeability, higher wettability and higher capillary pressure and leading to the best heat pipe performance ever achieved. During his research he was successful in manufacturing of a sintered micro wick layered FPHP, fabrication of a nanolayered wick FPHP and preparation of nanofluids of various concentrations based on functionalised CNTs.

Ghana - Project Completion Report of Mr. Festus Anane Mensah



Mr. Festus Anane Mensah, Research Scientist at Geotechnical Engineering Division, CSIR-Building and Road Research Institute, Ghana was deputed by the NAM S&T Centre to the Wadia Institute of Himalayan Geology, Dehradun, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 15th April to 8th October 2013 to carry out research work on a project titled 'Ground Water Hydrocarbon Potential Studies in the Ada East and Ada West Districts of the Greater Accra Region' under the supervision of Dr. S.K. Bartarya, Scientist F, WIHG, Dehradun.

The study of Mr. Mensah was aimed at, but not limited to, identifying immediate ways and means to well understand the nature of groundwater occurrence/management in the study area and relate it to possible hydrocarbon generation/storage using geochemical measurements for hydrocarbon source rock exploration and groundwater quality studies in the area. The stable isotope ($d^{13}C-DIC$, 2D and $d^{18}O$) for 48 number samples were analysed and the plot of d^2H versus ^{18}O for representative groundwater samples was prepared. The range of $d^{18}O$ is (-) 5.64- 2.27 with a mean value of (-) 2.39 while the range of $d^{13}C$ is (-) 24.99- (-) 8.52 and an average of (-) 12.63. d^2D ‰ values ranges between (-) 41.58- 9.31 and an average of (-) 14.57. Results from analyzed samples showed cases with both Cl^-/TZ^- anions ratio and HCO_3^-/TZ^- anions ratio less than 0.8 with high sulphate and silicate values suggesting that either silicate or carbonate dissolution occurred. However, groundwaters with $Na/(Na+Cl)$ ratio were approximately equal to 0.5 predicting halite dissolution. This water type occurs mainly in the area of sample numbers 2, 3, 4, 5, 6, 7, 8, 11, 12, 15, 17, 18, 19, 21, 22, 23, 24, 28, 29, 30, 31, 32, 34, and 42. Some of the samples also showed $Na/(Na+Cl)$ ratio higher than 0.5 indicating excess Na over Cl suggesting a sodium source other than halite dissolution possibly Plagioclase (Albite) weathering or reverse cat-ion exchange. Albite weathering is possible by the $SiO_2/(Na+K+Cl)$ ratio greater than 1 (the same ratio in which they occur in the mineral). This was evident in the areas of sample numbers 3, 7, 26, 27, 28, 31, 35, 40 and 43. $Mg/(Ca+Mg)$ ratio observed in results and its relationship with Cl^-/TZ^- anions ratio suggested dolomitisation is minute compared to the presence of abundant Cl dissolution taking place.

Mongolia - Project Completion Report of Ms. M. Amgalan



Ms. M. Amgalan, Ecological Engineer, School of Material Science of the Mongolian University of Science and Technology (MUST) and Air Quality Agency of Ulaanbaatar, Mongolia was deputed by the NAM S&T Centre to Karunya University Department of Physics, Coimbatore, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 during 16th March to 11th September 2013 to carry out research work on a project titled 'NLO Crystal Growth' under the supervision of Dr. M. Haris.

During her research work she observed that the nonlinear optical materials are attracting a great deal of attention because of their use in optical devices such as optical switches, optical modulators, electro-optical devices, etc. KDP group of materials remains the most widely used crystals for frequency conversion in spite of their modest nonlinearities. Organic materials have been of particular interest because the NLO responses in this broad class of materials is microscopic in origin, offering an opportunity to the use theoretical modeling coupled with synthesis flexibility to design and produce novel NLO materials. However the most organic materials are susceptible to damage because of their poor mechanical and thermal properties. Organic adduct of L-Tartaric acid Nicotinamide (LTN) is a novel NLO crystal material, with molecular formula $C_{20}H_{26}N_4O_{15}$. Crystal structure of LTN was built from organic-organic complexes in which the high optical nonlinearity of organic adduct is very advantageous compared with inorganic compounds. In her project, she reported the successful growth of different percentage (2M% and 4M %) of cerium (III) nitrate hexahydrate doped l-tartaric acid Nicotinamide (LTN) single crystals by slow evaporation solution growth technique at room temperature. The grown crystals subjected to the powder X-Ray diffraction analysis. The infrared spectra were obtained from KBr pellet on a SHIMAZU-IR Prestige 21 FTIR spectrometer. UV-Visible and absorbance spectrum was recorded to study transparency of grown crystals. Ms. M. Amgalan has published two papers in



(Contd. from Page 8 - RTF-DCS-2012-13)

reputed international journals based on the research work she carried out during this fellowship. During her stay in India she also attended the training programme in Satyabama University, Chennai on thin film synthesis and characterisation techniques which could help her to understand the theory of characterisation techniques.

Nigeria - Project Completion Report of Mr. Alhassan Yahaya



Mr. Alhassan Yahaya of Petrochemicals Division, National Research Institute for Chemical Technology, Nigeria was deputed by the NAM S&T Centre to Delhi Technological University (DTU), Delhi India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 during 16th February to 5th August 2013 to carry out research work on a project titled 'Evaluation of Vegetable Oils Epoxidation on the Chemical Qualities of Biodiesels' under the supervision of Prof. Naveen Kumar.

Mr. Yahaya undertook his research on the optimisation of the production of bio-diesel using different seed oils with the aim of finding out the maximal operational conditions of the reactions for the transesterification of vegetable oils into biodiesel including reaction time and temperature, molar ratio of reactants, stirring speed of the reactor and the catalyst concentration of the reactants. During his period of stay at Delhi Technological University, he also attended the lectures delivered by Prof. L.M. Das of Indian Institute of Technology (IIT), Delhi on 'Hydrogen Fuels and the Future for India' and by Dr. K.R. Vijek of the Indian Institute of Petroleum (IIP), Dehradun on 'Renewable Diesel using Hydro-deoxygenation; New Generation Technology', which were fruitful for him. He also attended the training programme on 'Operation and Maintenance of Bio-diesel Quality Control Equipment'.

Iraq - Project Completion Report of Mr. Muneer Naji Ahmed Hassan Al-Falahi



Mr. Muneer Naji, Agriculture Engineer, Designated in Ministry of Sciences and Technology in Baghdad, Iraq was deputed by the NAM S&T Centre to Division of Soil & Crop Management, Central soil Salinity Research Institute, Karnal, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 during 1st April to 27th September 2013 to carry out research work on a project titled "Effect of Phosphogypsum Addition on Some Soil Properties, Growth and Yield of Wheat (*Triticum aestivum* L)" under the supervision of Dr. D. K. Sharma and Dr. S. K. Chaudhari.

In his experiment the sixty five days old plant of pot experiments showed that different sources of irrigation water had effect on tiller height, number of tiller/hill and number of leave/ tiller than the 50-days old plant. Around 0.4 and 0.5 unit increases in pH₂ was observed on response to 12 cycle of irrigation in soil with normal and alkali water. Soil pH₂ showed a declining trend with increasing depth of soils for all chemically and organically treated pot irrespective of irrigation water. Farm yard manure reduced maximum salt load compared to other management practices when soil was irrigated with normal water. Appreciable quantity of salt load in incoming solution may increase the salt load soil with irrespective of organic and chemical amendments treatment. Application of normal water may help to leach the soluble from 0.0-7.5 cm layer and decline soil EC₂.

Participation of Centre's Scientists in Workshops/Seminars/Conferences

- 13-14 Feb 2014** **Mrs. Pinky Singh and Ms. Shania Tahir**, Research Assistants attended an International Conference on 'Wind Power in India' organised by the India Infrastructure at The Imperial Hotel, New Delhi.
- 22-24 Feb 2014** **Ms. Subhashree Basu**, Research Assistant and **Mr. M. Bandyopadhyay**, Senior Expert attended an International Conference on 'Sustainable Energy for All: Transforming Commitments to Action' organised by the NAM S&T Centre jointly with the Society of Energy Engineers and Managers (SEEM), Trivandrum, India at Christ University, Bengaluru, India, during which Ms. Basu presented a paper titled 'Biofuels - An Alternative Energy Source towards a Sustainable and Eco-Friendly future: The Indian Scenario'.
- 25-26 March 2014** **Mr. M. Bandyopadhyay** Senior Expert attended the 1st ACLE Symposium 'Preparing for Lightning Disaster across Africa - What is possible? What is next?' organised at Entebbe, Uganda and presented a paper titled 'Institutions- Industry Collaboration as a Public-Private Partnership Mechanism: The Indian Scenario'.

Distinguished Visitors To The Centre

- January 07, 2014** **Dr. Rakesh Kacker**, Director Designate, India Habitat Centre, New Delhi.
- January 08, 2014** **Prof. Venu Ittekkot**, Member, Executive Committee of the Scientific Committee on Oceanic Research (SCOR); Professor, Hamburg University; and Ex-Director, Leibniz Centre for Tropical Marine Ecology (ZMT), Bremen, Germany.
- March 05, 2014** **H.E. Hamid Reza Amiri Nia**, Advisor to the Presidency and Head of the Centre for Innovation and Technology Centre (CITC); **Mr. Hossein Ahmadi**, Manager of International Affairs, CITC; **Mr. Haj Ebrahimi**, Advisor CITC; **Mr. Mohamad Hosain Shojaee**, Deputy Chief of Mission of the Islamic Republic of Iran in New Delhi; **Dr. M. Hassan Shafazand**, Head of Technology Cooperation Section of the I.R. of Iran in New Delhi; and **Mr. Syed Jafar Mehdi Wasti**, Embassy of the I.R. of Iran in New Delhi



Distinguished Visitors To The Centre



H.E. Hamid Reza Amiri Nia, Head, CITC, Iran (2nd from L) and Mr. M. H. Shojaee, DCM of the Embassy of the I.R. of Iran in New Delhi (L, sitting)



Prof. Venu Ittekkot, Member SCOR Executive Committee and formerly, Director, ZMT, Bremen, Germany



Dr. Rakesh Kacker, Director Designate, India Habitat Centre, New Delhi, India

Director's Visits

Magnovite 2014

Prof. Dr. Arun P. Kulshreshtha, Director and Executive Head of the NAM S&T Centre, was invited on 21st Feb 2014 by the Christ University Faculty of Engineering (Kengeri Campus), Bengaluru, India as the Guest of Honor at the Inaugural Ceremony of Magnovite 2014, an Annual National Level Techno-Cultural Fest. In his lecture titled 'Thinking beyond Conventional Boundaries' Prof. Kulshreshtha shared his views on motivating the students on scientific thinking and creating innovative ideas of social relevance.



Inaugural Ceremony of Magnovite 2014, Christ University Faculty of Engineering (Kengeri Campus), Bengaluru, India

Visit to JSS University, Mysore, India



Meeting with Prof. B. Suresh, Director, JSS University, Mysore (2nd from L)

The Director along with Mr. M. Bandyopadhyay, Senior Expert & Administrative Officer and Ms. Subhashree Basu, Research Assistant of the NAM S&T Centre visited the JSS University in Mysore, India on 25th February 2014. In specific, they were briefed on the activities of the Molecular Biology Lab and the plastinated organs prepared in the Anatomy Lab. While calling on Prof. Dr. B. Suresh, Vice Chancellor, JSS University the possibility of a collaborative programme by organising a joint international workshop on Herbal Medicines was explored.

Visit to CFTRI, Mysore, India

The Director along with Mr. M. Bandyopadhyay, Senior Expert & Administrative Officer and Ms. Subhashree Basu, Research Assistant of the NAM S&T Centre visited the CSIR – Central Food Technological Research Institute (CFTRI), Mysore, India on 26th February 2014 and met Mr. M.C. Varadaraj, Chief Scientist & Coordinator, International S&T Unit. They also briefly visited a few CFTRI labs.

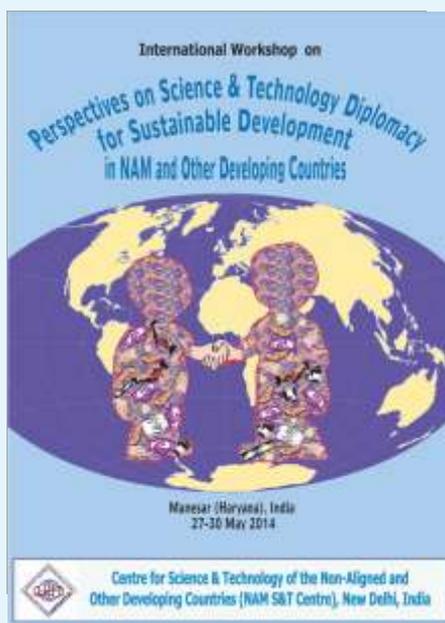


Meeting with Mr. M.C. Varadaraj, CFTRI, Mysore (3rd from L)

Centre Announces

International Workshop on Perspectives on Science & Technology Diplomacy for Sustainable Development in NAM and Other Developing Countries

Manesar (Haryana), India, 27-30 May 2014



Science has been in use since long as an instrument to attend to problems of mutual interest and build constructive bilateral, regional and multilateral partnerships between the nations in the areas of strategic relevance, technology transfer, IPR, trade and commerce etc. In recent period, climate and other global changes have started posing challenges with huge ecological, social, economic and political dimensions. The national governments, while addressing sustainable development at Rio+20 Earth Summit 2012, recognised the role of S&T in meeting these challenges and called for better linking of science and policy making as well as the need to build necessary science base in developing countries.

In international dealings among nations, science as a diplomatic tool helps in removing political barriers offering tangible benefits to the concerned parties. Science diplomacy aids in fostering international collaborations among scientists in nations, where official diplomatic relations might be limited or strained, by providing a platform for scientists to cooperate. The potential of science and technology is slowly gaining recognition and many developing countries have initiated actions in leveraging international cooperation for national needs and priorities through science diplomacy and making new investments in human resources and infrastructure to enhance their S&T capabilities.

Recognising the role of Science and Technology Diplomacy in facilitating bilateral, regional and multilateral cooperation, the NAM S&T Centre is organising an International Workshop titled '**Perspectives on Science and Technology Diplomacy for Sustainable Development in NAM and Other Developing Countries**' at **Manesar (Haryana) (near New Delhi), India during 27-30 May 2014**, the second in the series after the Centre's earlier workshop on the subject held in Tehran, Iran during 13-16 May 2012, with cooperation and partial financial support from the Department of Science and Technology (DST), Government of India.

The workshop is aimed at bringing together the senior Government officials of the developing countries, who are actual practitioners of international S&T cooperation and have been involved in carrying out bilateral and multilateral negotiations and formulating international agreements, protocols and arrangements, with a view to extensively deliberate on the role of S&T diplomacy in sustainable development for the exchange of information and capacity building in the subject. Presentation on country perspectives on utilising the mechanisms of S&T diplomacy to address specific issues such as Millennium Development Goals (MDGs) for poverty alleviation, environment, climate change, biodiversity, energy, water, food safety and security, health, etc will be welcome.

Among other objectives, the participants are expected to review the current status of S&T diplomacy in various developing countries; discuss the role of S&T diplomacy for technology sourcing, IPR issues and building S&T partnerships; identify the training needs; and recommend suitable mechanisms of cooperation for sharing the capabilities and experiences of the developing countries on S&T diplomacy.

The workshop programme has been primarily designed for the senior Government officials of the developing countries who are currently engaged in international science and technology cooperation and in diplomatic negotiations on S&T affairs on behalf of their countries. Completed Nomination Forms may be submitted directly to the NAM S&T Centre as early as possible, but latest by **Friday, 25th April 2014**.

For further details, please see the Website of the NAM S&T Centre: www.namstct.org.

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