COMSATS Newsletter

Commission on Science and Technology for Sustainable Development in the South (COMSATS)

Issue 2, Volume 14 March - April 2022

Participants and organizers of International Seminar on 'Sustainable Technologies in Modern Energy: A Roadmap Towards Green Economy' held under COMSATS-UNESCO South-South Regional (Asia-Pacific) Technical Cooperation Programme (details on page 03).

Inside this Issue

Patron:
Ms. Humaira Ahmed
Executive Director COMSATS

Editors:
Ms. Farhana Saleem
Ms. Isra Mahmood

Designing & Development:
Mr. Imran Chaudhry

From Editors' Desk

Our planet's fossil fuel resources are exhausting at a rapid pace – a predicament that rang alarm decades ago. The world since has not been able to do enough to deal with what it entails for the world population. Extreme drought and water crises, intense heat and temperature rise, increased pollution and related health problems, food scarcity, loss of biodiversity, and emergence of new strains of viruses and bacteria can all be linked to climate change, which point to dangerous levels of unsustainable use of resources.

Projections of climate related events and associated challenges do not demonstrate favorable trends for future. Over three-quarters of the world's population will be affected by drought by 2050 (United Nations Convention to Combat Desertification (UNCCD) - Drought in numbers 2022), the global temperatures would increase from 2.5 to 10 degrees Fahrenheit over the next century (The Intergovernmental Panel on Climate Change (IPCC)), and the world's population would touch 10 billion by 2050 (World Bank).

Unquestionably, the world today is in dire need of smart, innovative, and green solutions combined with sound policies to effectively manage resources and to mitigate some of the negative impacts of the global challenges. Global and regional cooperation, state actions and public administration measures in this respect need to be backed by strong community engagement, including, NGOs, NGIs, and other groups and individuals. Due participation and conscientiousness of civil society can help reinforce the efforts being made at the government and regional levels and strengthen societal pillars of "Sustainability".

During the reporting period, COMSATS concluded its South-South Regional (Asia-Pacific) Technical Cooperation Programme (2020-21) with UNESCO by holding events on Modern Energy and Industry 4.0 with its Centres of Excellence in Pakistan (COMSATS University Islamabad) and Sri Lanka (Industrial Technology Institute), respectively. Other events held during the reporting period had the overarching themes related to SDG2 (Zero Hunger), SDG3 (Good Health and Well-being, SDG6 (Clean Water and Sanitation), and SDG13 (Climate Action). Furthermore, this issue features an article celebrating the achievements and accomplishments of women scientists and researchers from the history as part of our efforts to highlight valuable role that women can play towards advocacy of S&T.

COMSATS' Centres of Excellence remained active in their scientific pursuits through signing of agreements, R&D and developing new technologies. Interesting developments in S&T in COMSATS' member countries are also reported in this issue to help inspire ideas and innovation in other developing countries.

Ideas and feedback on the contents of this issue and COMSATS' work are welcome.

Events under COMSATS-UNESCO South-South Regional (Asia-Pacific) Technical Cooperation Programme (Biennium 2020-21)

Under an MoU for execution of COMSATS-UNESCO joint project titled 'COMSATS-UNESCO South-South Regional (Asia-Pacific) Technical Cooperation Programme (Biennium 2020-21)' signed between COMSATS and the Pakistan National Commission for UNESCO (PNCU) in November 2021, last two collaborative events were organized during the reporting period.

International Conference on 'Industry 4.0 in the Developing World: Challenges, Gaps and Opportunities' (16th – 17th March 2022)

COMSATS partnered with its Centre of Excellence in Sri Lanka, Industrial Technology Institute (ITI), to organize 'International Conference on 'Industry 4.0 in the Developing World: Challenges, Gaps and Opportunities', on 16th-17th March 2022.

The 25 speakers of the two-day Conference belonged to Industrial Technology Institute (ITI), Sri Lanka; Ministry of Technology and State Ministry of Digital Technology & Enterprise Development, Sri Lanka; Ministry of Youth & Sports, Sri Lanka; Ministry of Development Coordination and Monitoring; Sri Lanka; Pakistan National Commission for UNESCO (PNCU), Pakistan; UNIDO Headquarters, Austria; UNIDO Office, Pakistan; National Research Centre (NRC), Egypt; Presidential Committee on Emerging Technologies, Government of Pakistan; Institute of Policy Studies (IPS), Sri Lanka; Digital Dubai, UAE; Linked Things, Pakistan; Ministry of Information Technology and Telecommunication, Pakistan; COMSATS University Islamabad (CUI), Pakistan; Information and Communication Technology Agency (ICTA), Sri Lanka; Huawei Technologies Lanka Co (Pvt.) Ltd., Sri Lanka; University of Moratuwa, Sri Lanka; Sri Lanka Electronics Manufacturers and Exporters Association (SLEMEA), Sri Lanka; Entgra Pvt. Ltd., Sri Lanka; Aitken Spence, Sri Lanka; Yazılım Teknolojileri Araştırma Enstitüsü (YTE), TÜBITAK, Türkiye; and COMSATS Secretariat, Pakistan.

The inaugural session of the event was held on 16th March 2022, and was presided over by His Excellency Mr. Namal Rajapaksa, Minister of Youth & Sports/Minister of Development Co-ordination and Monitoring and State Minister of Digital Technology & Enterprise Development of Sri Lanka.

In his welcome address, Chairman of ITI, Sri Lanka, Dr. G.A.S Premakumara, noted that in view of the rapid advancements in emerging technologies, it is vital for policy and decision makers to remain informed of such advancements.

In his opening address, Mr. Jayantha De Silva, Secretary to the Ministry of Technology of the Government of Sri Lanka, emphasized that our future course of action should be based on the knowledge of innovations driven by enabling technologies, such as IoT, AI, and robotics. He further stated that countries are already beginning to consider Industry 5.0 and Industry 6.0 as alternatives to Industry 4.0 depending on their existing levels of digital infrastructure, culture, social status, and economic situation.

Addressing the gathering at the inauguration, Mr. Syed Junaid Akhlaq, Secretary General, PNCU, considered it important for developing countries to make quick learning and duly invest in science, technology, and innovation infrastructure.

In his keynote address, Dr. Bernardo Calzadilla-Sarmiento, Managing Director at Directorate of Digitalization, Technology and Agri-Business, and Director at Department of Digitalization, Technology and Innovation, UNIDO, Austria, noted that advancements under the 4IR provide realistic solutions to our current and future challenges, including global poverty, climate change, and achieving SDGs.

Prof. Dr. Ashraf H. Shaalan, Chairperson COMSATS Coordinating Council opined that the Fourth Industrial Revolution is an excellent opportunity to unite global communities, build sustainable economies, adapt and modernize models, and to commit to value-based leadership of emerging technologies.

The Chief Guest for the occasion, H.E. Mr. Namal Rajapaksa, stated that Sri Lankan government is updating cross-sectoral traditional procedures to keep up with the pace of emerging technologies while ensuring that they encourage all stakeholders to legislate, regulate, set and implement agenda for critical work.

Dr. Radhika Samarasekera, Director General of Industrial Technology Institute (ITI), and the Conference Chairman, lauded the efforts made by COMSATS and UNESCO for organizing the Conference and also hoped that the event will be a catalyst for driving new approaches and collaborative efforts to benefit from Industry 4.0.

The event's sessions included: Introduction to 4IR – Implications for developing countries; Blockchain & 4IR Technologies; Society 5.0; Innovations and upcoming trends and applications of 4IR; and Smart Cities. The sessions covered the following, respectively:

- resurgence of economy through technology diffusion; digital transformation and 4IR for competitiveness; risks and opportunities in 4IR; and preparing Sri Lanka's labour market for Industry 4.0.
- potential of blockchain for reducing the digital divide; implementing industrial IoT in emerging markets; and learning from blockchain deployment in UAE.
- Society 5.0 vs Industry 4.0 and future of education and culture in the light of AI.
- 4IR technologies for health, agriculture, energy, and disaster risk management.
- impact of digital technology on international trade; digital transformation of cities; as well as technology enablement for new business models and international trade.

At the end of the technical sessions, a panel discussion was held that was moderated by Mr. Hiranya Samarasekera, Principal Advisor at the Ministry of Technology, Sri Lanka. Discussions during the session covered a number of policy and technical aspects.

International Seminar on 'Sustainable Technologies in Modern Energy: A Roadmap Towards Green Economy' (7th – 8th March 2022)

A two-day International Seminar on 'Sustainable Technologies in Modern Energy: A Roadmap Towards Green Economy' was held on 7th and 8th March 2022. The event was aimed to provide interdisciplinary forum to academicians, scientists and early career researchers to deliberate on the importance of energy efficiency, sustainable and renewable energy resources, technologies and applications.

The event was inaugurated by H.E. Mr. Shibli Faraz, Federal Minister for Science and Technology, Government of Pakistan, on 7th March 2022, in a ceremony hosted at the premises of Pakistan Academy of Sciences (PAS), Islamabad.

In his welcome speech, Rector CUI, Prof. Dr. Muhammad T. Afzal, inter alia, highlighted the need for more research and development in grid technology to bring it in line with modern energy needs, which has a huge potential of drawing investors in smart grids.

Speaking on the occasion, Mr. Syed Junaid Akhlaq, Secretary General Pakistan National Commission for UNESCO (PNCU), was of the view that the advancement of sustainable innovative technologies in modern energy would improve energy security, environment, economy, mechanical

manufacturing, construction, transportation, and industry, as well as contribute to the creation of new jobs.

During his virtual participation, Prof. Dr. Ashraf Shaalan shared the perspective of COMSATS Coordinating Council comprising of the leadership of COMSATS' Centres of Excellence. He considered nations' abilities to keep up with technological progress and innovation, critical for socio-economic growth.

Speaking on the occasion, the Honourable Minister appreciated the role of developing sector and academia in highlighting the issues and initiating key debates on RETs, sustainable development, and green economy. In view of hiking fossil fuel prices, he also emphasized the need for exploiting smart technologies, efficient grids to address issues of the energy demand side in Pakistan. Mr. Faraz further opined that small conservations from energy efficient appliances translate into big savings on large energy projects.

The talks of the event covered a number of issues pertinent to the theme of the event, including: digital engineering; Lithium-ion Batteries as Energy Storage Device; Indigenous development of hydropower: RE-based based Distributed Generation; Multifunctional electrode materials for li-ion battery and super capacitors; Sustainable Technologies in Modern Energy; Solar Thermal Air Conditioning Technologies; and Materials for Solar Energy and Hydrogen Production.

The speakers and experts of the two-day event represented major Universities and institutions of Pakistan.

Other Capacity Building Events and Observances

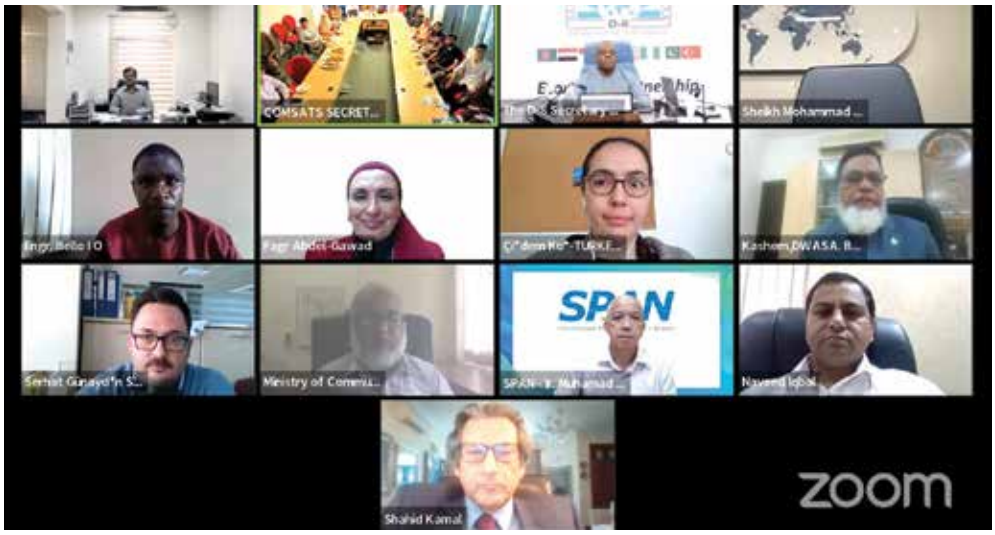
Webinar on 'Feasibility Study of Safe Drinking Water through Water Conservation' (30th March 2022)

COMSATS Centre for Climate and Sustainability (CCCS) in collaboration with the Centre for Climate Research and Development (CCRD) at COMSATS University Islamabad (CUI), Islamabad, organized a webinar on 'Feasibility Study of Safe Drinking Water through Water Conservation', on 30th March 2022. The webinar was physically and virtually attended by over 70 participants from Pakistan, Bangladesh, China, Egypt, Ghana, Jamaica, and Nigeria.

The webinar aimed to share the outcomes of the ongoing project titled 'Feasibility Study for Provision of Safe Drinking Water through Water Conservation (SDWC)' being run in three D-8 member countries, i.e., Egypt, Nigeria and Pakistan with the financial support of D-8 Secretariat, Turkey. Within the framework of Sustainable Development Goal 6 (SDG6) – Clean Water and Sanitation – the project was launched with the facilitation of COMSATS Secretariat and the Ministry of Foreign Affairs, Government of Pakistan.

In their remarks at the opening, Ambassadors Shahid Kamal (Founder of CCCS) and Isiaka Abdulqadir Imam (Secretary General of D-8 Secretariat) welcomed the participants, and commended the project stakeholders and acknowledged the holding of the present webinar. Speaking on the occasion, Dr. Ata ur Rehman, Additional Secretary, Ministry of Science and Technology, Government of Pakistan, highlighted the importance of water conservation.

Dr. Toqeer Ahmed, Principal Investigator of the Project, shared the progress of the study with a brief history of smart water metering, water supply situation



in Islamabad, importance of water conservation and different research activities carried out under his projects.

Prof. Dr. Fagr Abdel Gawad from National Research Centre (NRC) of Egypt and Prof. Dr. Kenneth Yongabi from Imo State University of Nigeria shared their views about water conservation activities in their respective countries. GIS based mapping of the study area was explained by Ms. Saima Naz, GIS expert from CCRD.

Dr. Naveed Iqbal, Director Water Management, Pakistan Council of Research in Water Resources (PCRWR), delineated water management practices in Pakistan and discussed different strategies in this connection like roof top harvesting, artificial ground water recharge, water metering and pricing component.

Workshop on 'Crop Microbiome and Sustainable Agriculture' (13th April 2022)

COMSATS in collaboration with its Centre of Excellence in China – the Tianjin Institute of Industrial Biotechnology (TIB), organized a workshop titled "Crop Microbiome and Sustainable Agriculture" from the platform of COMSATS Joint Centre for Industrial Biotechnology (CCIB), on 13th April 2022.
Speakers from Bangladesh, China, Iran, and Kazakhstan delivered lectures to 80 scientists/ researchers. The participation was through both virtual and physical means.

Opening the event, Prof. Dr. Jibin Sun, Director of CCIB/Deputy Director-General of TIB, opined that crop microbiome has the potential to enhance agricultural productivity; reduce occurrence of plant diseases; diminish the need for chemicals and reduce emissions of greenhouse gases.

In his opening remarks, Chairperson COMSATS Coordinating Council, Prof. Dr. Ashraf Shaalan, stated that natural ways to supplement conventional agricultural practices must be sought in order to meet the global demand for food, which is anticipated to climb by 70% by 2050. He viewed microbiome as a potential long-term solution to the challenge of food insecurity. He communicated COMSATS' resolve to continue strengthening relevant capacities of scientific community in its Member States.

The technical proceedings of the workshop featured a keynote address, titled 'Manufacture of Bio-organic Fertilizers to Manipulate Soil Microbial Communities', delivered by Prof. Qirong Shen, Academician of Chinese Academy of Engineering (Professor, Nanjing Agricultural University, China). Prof. Shen's talk was followed by the presentations by experts from China, Kazakhstan Bangladesh, and Iran on:

- Development and Application of Microbial Fertilizer;
- Phosphate Biofertilizer: a Manifold Solution for Sustainable Agriculture;
- Biotechnological Production of Bacillus Thuringiensis Biopesticides;
- Biotechnological Potential of Soil Cyanobacteria in Agriculture;
- Interactions between Plants and Root Microbiome in Arabidopsis and Rice.

The event was concluded by Ms. Qianqian Chai, Officer of Foreign Affairs and Academic Exchange, TIB, who also announced the holding of four workshops by CCIB during 2022 under its joint R&D groups with one scheduled for June 2022.

Webinar on 'Building Climate Resilient Health Systems in the Global South' (6th April 2022)

As an observance of 2022-World Health Day (April 7th), the Telehealth Desk of COMSATS in collaboration with COMSATS Centre for Climate and Sustainability (CCCS) organized a webinar titled 'Building Climate Resilient Health Systems in the Global South' on 6th April 2022.

The event was joined by the notable speakers from World Health Organization Regional Office for the Eastern Mediterranean (WHO/ EMRO), Egypt; Theodor Bilharz Research Institute (TBRI), Egypt; InterAcademy Partnership (IAP), Italy; St. Luke's Medical Center College of Medicine, Philippines; Somali Greenpeace Association (SOGPA),

Somalia; Globesight, UAE; and Indiana University–Purdue University Indianapolis (IUPUI), USA. It had a virtual gathering of more than 40 from COMSATS Focal Points and Centres of Excellence, as well as ministries of climate and health, and other relevant stakeholders.

Opening the event, Dr. Azeema Fareed, Principal Medical Officer at COMSATS Telehealth Programme, shed light on the importance of building sustainable and more resilient health systems.

In his introductory remarks, Ambassador (Rtd.) Mr. Shahid Kamal (founder CCCS), was of the view that limited interventions are in place against climate crisis, more so against its impact on human health, resulting in delay in progress towards achieving the SDGs.

In her video message, Ms. Xiaojun Grace Wang, Deputy Director of United Nations Office for South-South Cooperation (UNOSSC), USA, highlighted the strong connection between climate and health, and underscored that changing climate is damaging the socio-environmental determinants of health.

In his presentation during the technical session, Dr. Renzo R. Guinto, Director of Planetary and Global Health Programme, St. Luke's Medical Center College of Medicine, Philippines/ Co-Founder and Chief Planetary Health Scientist at Sunway Centre for Planetary Health, Malaysia, stated that although climate crisis is contributing to health inequalities, building of responsive health systems should take into account the environmental toll and ensure that such systems are not contributing to climate crisis through carbon emissions.

Other experts from Pakistan, Somalia, USA, Egypt, and Italy, covered various aspects of the theme of the day, these included:

- Growing inequalities, food and water insecurity;
- rising trends of atmospheric carbon dioxide and global temperatures;
- need for more effective partnerships across sectors and communities;
- public health challenges related to Climate Change;
- increased vulnerabilities and health risks of populations across the globe;
- Higher risks of waterborne diseases;
- Stress on health systems globally due to the pandemic and climate change.

The Regional Advisor to WHO/EMRO, Engr. Mazen Malkawi, urged to make efforts for overcoming widening inequalities and considered it one of the key ways to mitigate climate threats to populations.

During the Q&A session, insightful discussions took place regarding mitigation measures to overcome challenges related to: coordination between climate agencies and health experts for the climate resilient health systems; initiatives taken by UN agencies to cope with climate disasters in health sector; research gaps in the countries of the South; and strengthening health systems.

Visit of Mr. Tamerlan Khalilov, Deputy Head of Mission of Azerbaijan to Pakistan (20th April 2022)

On 20th April 2022, Mr. Tamerlan Khalilov, Deputy Head of Mission of Azerbaijan to Pakistan, visited COMSATS Secretariat, along with Mr. Khalid Taimur Akram (Executive Director), and Mr. Faisal Sheikh (Member – Board of Experts) of Center for Global & Strategic Studies (CGSS) – a public policy institution based in Islamabad, Pakistan.

The visiting delegates held a meeting with senior officials of COMSATS. They received a briefing on COMSATS, its mission, functions and objectives as an intergovernmental organization working for international cooperation in S&T. It was informed that COMSATS is focused at S&T-led sustainable development. The Deputy Head of Mission was also apprised of various scholarship opportunities available at COMSATS' Centres of Excellence, including COMSATS University Islamabad (CUI), Pakistan.

CGSS also extended support for facilitating joint projects to help promote cultural and academic cooperation between the two countries.

SOME ACTIVITIES OF COMSATS' CENTRES OF EXCELLENCE

RSS-Jordan Consolidates Collaboration with IIASA-Austria

A high-level, technical delegation from the International Institute for Applied Systems Analysis (IIASA), Austria, visited the Royal Scientific Society (RSS) of Jordan in March and met with HRH Prince El Hassan bin Talal, Founder and Chairman of the Society. The delegation, led by Director General, Albert van Jaarsveld, discussed prospects to consolidate research collaboration in the field of systems analysis as well as applying systems science to global and national challenges, such as water scarcity, sustainable energy transition, air and water pollution, the impact of climate change on agriculture, and using science to build bridges across national boundaries.

In another meeting, led by HRH Princess Sumaya bint El Hassan (President of RSS), the technical team of RSS exchanged collaborative ideas with IIASA researchers. RSS is the main partner of IIASA in Jordan and the country is a prospective member of IIASA through the Society.

Scientific Forum on Vertical Farming Inaugurated at RSS-Jordan

Under the Patronage of HRH Princess Sumaya bint El Hassan, President of RSS, a Scientific Forum entitled 'Controlled Vertical Agriculture: A Tool to Contribute in Food Security in Amidst of Climate Change' was inaugurated at RSS, Jordan, on 31st March 2022. Specialists, academics and farmers from Jordan, Britain, Saudi Arabia, Egypt, Iraq, and Syria participated virtually and/or physically in the Forum.

The Forum is part of a project implemented by the Water, Environment and Climate Change Centre at the Society in cooperation with the University of Plymouth, England, and funded by the British Academy of Engineering within the Frontiers Champions Programme. The project aims to identify the challenges and opportunities associated with Controlled Environment Agriculture and its role in achieving food security in the backdrop of climate change.

RSS Receives ICT Green Award from IFGICT

The International Federation of Global Information and Communication Technology (IFGICT) has conferred its most prestigious award to RSS, Jordan, designating it as a "Green Business".

Conferred in the field of green information technology, the Award is the first for the Middle East and Gulf Cooperation Council (GCC) region. The Award was received by Engr. Ahmed Masadeh, Executive Director of ICT for Development Sector at RSS, Jordan.

The Green Business Certificate of quality was awarded based on a comprehensive ICT audit that was carried out over the course of a year during which IFGICT representative in Jordan – Metanoia Training and Consulting – worked closely with the RSS staff.

TÜBİTAK MAM's 6th National Antarctic Science Expedition Concludes

Under the auspices of the President of Turkey, with the patronage of Turkish Ministry of Industry and Technology, and the coordination of TÜBİTAK MAM Polar Research Institute (KARE), Türkiye, the 6th National Antarctic Science Expedition, which started on 22nd January 2022, has returned to Turkey.

The expedition team of 20 reached the Antarctic continent on 2nd February 2022 and studied 14 scientific projects having 29 institutions as stakeholders. During the study, the team used indigenous tools and equipment, including HAVELSAN's national GNSS receiver, UAV (Unmanned Aerial Vehicle), thermal batteries developed by TÜBİTAK Defense Industries Research and Development Institute (SAGE), as well as Ground Motion Monitoring System (Yer-HIS) developed by the TÜBİTAK Rail Transport Technologies Institute (RUTE).

Progress of TÜBİTAK-ULAKBIM's EuroCC Project

The Turkish Academic Network and Information Centre (ULAKBIM) of TÜBİTAK, Türkiye, is successfully conducting the project EuroCC - National Competence Centres under the framework of EuroHPC. During the reporting period, the following activities were organized within the scope of the Project to increase awareness in the fields of High-Performance Computing (HPC), Big Data, and Artificial Intelligence, as well as to share the experiences and advantages of using HPC at the national level.

- Seminar on 'Digital Weather Forecast Model (SHT) Parameterization Optimization';
- Quantum Computing and Technologies Workshop;
- Webinar on 'PARALLEL COMPUTING on GPUs with CUDA;
- Training on 'High-Performance CFD using OpenFOA'.

TÜBİTAK MAM-Türkiye Foster Cooperation with ICGEB

A three-member delegation of the International Center for Genetic Engineering and Biotechnology (ICGEB), led by Dr. Lawrence Banks (Director ICGEB), visited TÜBİTAK Marmara Research Center (MAM), Türkiye, on 18th March 2022. The visit was aimed at discussing the modalities of the establishment of ICGEB Regional Research Center (RRC) in Türkiye.

The visiting delegates also examined the research infrastructure of TÜBİTAK MAM Life Sciences and were informed about the research studies carried out at various laboratories. As an affiliated center, TÜBİTAK MAM Life Sciences has been representing TÜBİTAK and Türkiye in ICGEB since 1989.

Rankings of AQU-Palestine

Al-Quds University (AQU), Palestine, has been ranked first among the Palestinian universities, according to the SCIMAGO World University Rankings for the first quarter of 2022. Further, it ranked 27th in the Arab world, and at 600 place out of 8000 universities and research institutions worldwide.

According to SCIMAGO ranking, AQU ranked first in the Palestinian territories in the fields of Energy, Medicine, and Pharmacology, and 20th and 21st in the Arab world in Energy and Medicine, respectively. This classification is based on the indicators of research tools, innovation outputs, and social impact.

Moreover, AQU ranked second among Palestinian universities according to the QS World Higher Education Institutions classification for the year 2022, and was among the best 51-60 Arab universities in citation. According to QS report for the year 2020-2021, the university won first place locally and was 21st regionally in the number of citations for each research paper, and it ranked second Palestinian university in terms of research cooperation worldwide.

KazNU-Kazakhstan to Enhance Research Linkages with Hungarian Varsities

The Rector of Al-Farabi Kazakh National University (KazNU), Kazakhstan, Prof. Dr. Zhanseit Tuimebayev, held a meeting with Ambassador Extraordinary and Plenipotentiary of Hungary to Kazakhstan, H.E. Mr. Otto Ivan Ron, and the Consul General of Hungary in Almaty, Mr. Ferenc Blaumann, on 21st April 2022.

During the meeting, the two sides discussed matters of furthering cooperation between Al-Farabi KazNU and Hungarian universities. Prof. Tuimebayev proposed developing joint educational programmes with partner Hungarian universities, as well as to hold virtual and physical conferences to exchange experiences and ideas for the development of advanced methods of teaching and research. He also suggested conducting joint scientific research on topical areas of science and innovation development, and organizing exhibitions, scientific and other cultural events. Prof. Tuimebayev also stressed the need to develop joint scientific projects for international grant competitions.

Receptive of Prof. Tuimebayev's proposals, the Ambassador proposed creating joint research centres and to work further in this domain.

Nanotechnology-based Lamp Developed at KazNU-Kazakhstan

Scientists at National Nanotechnology Open Laboratory of Al-Farabi KazNU, Kazakhstan, have developed a unique technology for increasing the intensity of the glow of gas-discharge lamps based on nanotechnology, which has a low cost and high quality. The intensity of the glow of the developed lamp is one and a half times greater than that of similar fluorescent lamps with equal power consumption.

KazNU-Kazakhstan Signs Agreements with UW-Poland and NAS-Kazakhstan

In two different events, held on 6th and 12th April 2022, Al-Farabi KazNU, Kazakhstan, has signed Memoranda of Cooperation with University of Warsaw (UW), Poland, and the National Academy of Sciences (NAS) of Kazakhstan, respectively.

Al-Farabi KazNU already has an Agreement in place with Polish universities under which it implements various educational programmes, and scientific and innovative projects. Establishment of a laboratory named after Maria Sklodowska-Curie and mobility of 150 students of Al-Farabi KazNU for research internships at Polish universities are two such examples. The current Agreement signed aims at exchange of students between Al-Farabi KazNU and the University of Warsaw.

The Agreement with NAS was signed on the "Day of Science Workers" by Prof. Dr. Murat Zhurinov, Doctor of Chemical Sciences, President of NAS, and Prof. Tuimebayev, Rector of Al-Farabi KazNU.

Rector of Al-Farabi KazNU Awarded with Order of "Barys" II Degree

On 18th March 2022, the Rector of Al-Farabi KazNU, Kazakhstan, Prof. Dr. Zhanseit Tuimebayev, has been awarded with the II degree "Barys" Order for the following merits: strengthening the statehood and sovereignty of Kazakhstan; ensuring peace, consolidation of society and unity of the people of Kazakhstan; in state, industrial, scientific, socio-cultural and social activities; and strengthening cooperation between peoples, rapprochement and mutual enrichment of national cultures, friendly relations between states.

Researchers of Embrapa Agrobiologia, Brazil, Stand Out in International Ranking

Six researchers of Embrapa Agrobiologia, Brazil, have been ranked as the most cited scientists among 36 Brazilian scientists in the field of plant and agronomic sciences, according to a ranking published by Research.com.

The profiles of 166,880 scientists worldwide were analyzed in 21 areas of science and more than 2,575 profiles were scrutinized in the area of Plant Science and Agronomy. The inclusion criteria for researchers included h-index, scientific contributions, citations, awards and achievements in the area.

UTG-The Gambia Strengthens Academic Cooperation with China

Prof. Herbert Robinson, Vice Chancellor of the University of The Gambia (UTG), The Gambia, met with H.E. Mr. Ma Jianchun, Ambassador of China to The Gambia, at the Chinese Embassy, on 16th March 2022. The Vice Chancellor was accompanied by Prof. Momodou Jain, DVC (Administration); Mr. Zhang Chao, Director of the Confucius Institute of the UTG; and Mr. Mbakeh Camara, Director of International Relations & Innovation. Mr. Li Xiaoquan, Director of Political Affairs at the Chinese Embassy was also present during the meeting.

Prof. Robinson acknowledged the strong support rendered by Chinese Embassy to UTG and expressed willingness to strengthen cooperation for capacity-building and the training of youth so as to cultivate more talent for the development of The Gambia.

Ambassador Ma appreciated fruitful cooperation between China and

The Gambia in the fields of health, agriculture and infrastructure, and regarded the important role played by the UTG in people-to-people exchanges between China and The Gambia.

Furthermore, in a ceremony on 29th March 2022, His Excellency Ma Jianchun awarded 20 scholarships for the students of UTG, The Gambia, for the 2022 academic year.

Speaking on the occasion, the Ambassador stated that the scholarship aims to support outstanding and underprivileged students so as to motivate them to work harder to help build a better future for themselves and contribute to national development.

SARI/CSIR-Ghana Studies OFA for High Crop Yields

The Savannah Agricultural Research Institute (SARI) of the Centre for Scientific and Industrial Research (CSIR), Ghana, has reported in a study that the use of organic farming aid (OFA) used on its own or combined with inorganic fertilizer can help improve crop yields and achieve maximum yields in the cultivation of maize, cowpea and groundnut.

The study was conducted to determine the effect of the application of OFA on the improvement of the growth and yield of maize; its protective properties in terms of managing aflatoxin contamination in groundnut; and its ability to manage cowpea pests compared to synthetic insecticides. The research was carried out at the research fields of the CSIR-SARI at Nyankpala in Tamale, as well as some selected farms in the Sagnarigu municipality in the Northern Region, during the 2021 cropping season.

The findings of the research suggest that irrespective of the frequency of application of OFA to maize, either two or three times, the highest economic returns were achieved when 100 per cent OFA plus 50 per cent NPK was applied.

Faculty Member of CUI-Pakistan Receives Award of Excellence

Prof. Dr. Muhammad Abid, Director IRC/ Chairman and Professor of Mechanical Engineering at Wah Campus of COMSATS University Islamabad (CUI), has been awarded with Government of Pakistan's Tamgha-e-Imtiaz (Award of Excellence) in recognition of his contributions in the field of Mechanical Engineering. Prof. Abid received the Award from the President of Pakistan, Dr. Arif Alvi, during Pakistan Civil Awards Ceremony held on 23rd March 2022 at the President House, Islamabad.

Call for Proposals by TÜBİTAK-Türkiye

- **TÜBİTAK-NRF Call for Proposals 2022:** Based on the Memorandum of Understanding signed between TÜBİTAK and the National Research Foundation (NRF), Korea, the 2022 Call for Proposals has been launched to enhance the cooperative activities in the field of research between the two countries. There is no restriction on the research themes. Final deadline for online proposal submission is 30 June 2022.

  For details and application, please follow the given link: https://www.tubitak.gov.tr/sites/default/files/3125/tubitak-nrf_2022_call_text_final.pdf.

- **3rd Joint Call for Proposals of TÜBİTAK - NARD Bilateral Cooperation Projects:** Call for joint projects has been opened within the framework of the Cooperation Agreement between TÜBİTAK, Türkiye, and the National Agency for Research and Development (NARD), Moldova. The call is open in following thematic areas: Engineering and Technology; Medical and Health Sciences; Agricultural Sciences; Social Sciences related with World crises; and Environment (Soil, Water, Climate). The 3rd Joint Call is opened till 1st July 2022 for online submission. For details and application, follow the given link: https://www.tubitak.gov.tr/sites/default/files/3125/3rd_joint_call_for_proposal_tubitak_nard_apr_2022.pdf.

Egypt Launches Platform for Sustainable Development Solutions for SSC

The Egyptian Ministry of International Cooperation and the United Nations Development Programme (UNDP) has launched a coordination platform on Sustainable Development Solutions for South-South Cooperation (Daily News Egypt; 19th April 2022). The platform's activities were inaugurated by H.E. Ms. Rania Al-Mashat, the Minister of International Cooperation of Egypt and Mr. Alessandro Fracassetti, the Resident Representative of UNDP in Egypt.

The platform aims to enhance discussions between the government, the UNDP, and multilateral and bilateral development partners on benefiting from the leading Egyptian experience in the field of development cooperation, projects implemented with international partners in various development sectors, and expertise accumulated over decades in strengthening South-South and triangular cooperation to help transfer expertise and experience.

China Launches its First Multilateral Cooperation Platform on Climate Change

Fostering its cooperation with Pacific Island countries, China has launched a China-Pacific Island Countries Climate Action Cooperation Center (Global Times; 29th April 2022). The center is co-built by the Chinese Ministry of Foreign Affairs, the Ministry of Ecology and Environment (MEE) and East China's Shandong Province.

As China's first multilateral cooperation platform in climate change, the Centre is expected to enhance the exchanges and practical cooperation between the countries involved.

Pakistani Healthcare Professional Wins Global Healthcare Award

Dr. Zulfiqar Bhutta, a healthcare professional and researcher, has been conferred the "John Dirks Canada Gairdner Global Health Award" in recognition of his achievements in global health research. Dr. Bhutta has received this Award for his research paper titled "Maternal and Child Nutrition: The First 1,000 Days", which includes an evaluation of evidence-based interventions in child and maternal health for marginalized populations in the first thousand days after birth (Aga Khan Development Network; 5th April 2022).

The Awardee is the founding director of the Center of Excellence in Women and the Child Health and Institute for Global Health and Development at the Aga Khan University in Karachi, Pakistan. He was one of the five 2022 Canada Gairdner International Award laureates who have been recognized for seminal discoveries or contributions to biomedical science around the globe.

Gambia Validates its First National Research Policy

Gambia's first National Research Policy was launched by Ministry of Higher Education, Research, Science and Technology (MoHERST) during a symbolic event held on 5th April 2022 in Bijilo (AllAfrica; 7th April 2022). MoHERST is also COMSATS Focal Ministry in the country. This policy provides a legal framework and regulatory instruments to guide research operations in Gambia.

Speaking on the occasion, Mod A.K. Secka, Permanent Secretary of MoHERST, highlighted the importance of scientific discovery through research and considered it key to present day development needs. The Director of Research at MoHERST, Mr. James Gomez, recalled a study conducted jointly by MoHERST and UTG in 2010 concerning research in The Gambia, that indicated collaboration gaps between institutions.

The event was attended by officials from the Ministry of Health (MoH), Ministry of Basic and Secondary Education (MoBSE), Medical Research Council (MRC), Gambia National Library, University of The Gambia (UTG), Management Development Institute (MDI), and staff of MoHERST, among other stakeholders.

Somalia Fosters Collaborations in Energy

Somalia is pacing up its efforts to invite and encourage foreign investment and big projects to address its energy needs. Sixty seven percent of Somalia's population is lacking access to electricity and high power tariffs.

On the flipside, Somalia has over 300 days of sunshine a year. Countries like Germany with far fewer sunshine days (about half that of Solamia's) have been able to generate 50,000 MW from solar energy.

Off-grid solar power, therefore, may be a solution to Somalia's huge energy challenge alongwith decentralised electrification and expansion of the

national grid. This can be further aided by harnessing wind power.

To make this possible, Somalia is working towards creating a conducive environment and incentives for private investors, and foster collaborations with development partners for reviving the energy sector.

In this vein, Government of Somalia has announced a $150 million electricity recovery facility, in partnership with the World Bank, to make cheaper energy possible for Somalis. A power master-plan has been developed detailing a 20-year least-cost plan.

Other partnerships in this respect include a $95 million fund developed with AfDB (trtworld.com; 29th April 2022).

Tanzania Aims to Expand its Geothermal Capacity to 200 MW

Tanzanian government aims to inject 1100 MW of renewable energy produced from geothermal, solar, and wind into the national grid system and intends expanding its geothermal power capacity to 200 MW by 2050. To help achieve this target, the Government of Tanzania has identified 52 potential sites across the regions of Mbeya, Arusha, Iringa, Kilimanjaro, Dodoma, Shinyanga, Morogoro, Mwara, Manyara, Kagera, Katavi, Rukwa, Tanga, Singidi, and Songwe (Think GeoEnergy; 28th April 2022).

The Tanzania Geothermal Development Company (TGDC) of the country is exploring several sites for geothermal development that include Ngozi in Mbeya and Songwe regions, Kiejo-Mbaka in Mbeya, Natron in Arusha, and Luhoi in the coastal region.

Social Enterprise Ghana Trains Hubs in Green Economy

Since 2019, SNV Netherlands Development Organisation (SNV) has been implementing the Boosting Green Employment and Enterprise Opportunities in Ghana (GrEEn) project – a four-year action from the European Union, the Embassy of the Kingdom of the Netherlands in Ghana, SNV and the United Nations Capital Development Fund (UNCDF).

The project aims at creating greater economic and employment opportunities for youth, women and returning migrants by promoting and supporting sustainable, green businesses in two selected regions in Ghana: Ashanti and Western.

Recently, SNV partnered with Social Enterprise Ghana, a network of high impact social enterprises and hubs to train 32 hub leads and enterprise support organisations across Ghana. The training is aimed at supporting start-ups and Micro, Small and Medium-sized Enterprises (MSMEs) in the green and circular economy (MyjoyOnline.com; 26th April 2022).

The two-day Training of Trainers (ToT) workshop covered various topics, including green business models, green product development, green product marketing and green financing which is intended to enable the hubs and enterprise support organisations to understand the green and circular economy and how they can support businesses in their portfolios to improve their environmental impact.

Egypt and UK Discuss Cooperation in Different Socio-Economic Domains

Egypt and the UK are exploring avenues of cooperation in a number of areas including health, education, communications, information technology, digitalization and small and medium-sized companies as well as women empowerment, vocational training and agricultural value chains.

These avenues were discussed on March 11, 2022, during a meeting between Egyptian Minister of International Cooperation, H.E. Ms. Rania Al-Mashat, and the UK's Minister of State of Foreign Commonwealth and Development Affairs, Lord Tariq Ahmad of Wimbledon (EgyptIndependent; 12th March 2022).

continues on page 15

Some Phenomenal Ladies of the 20th Century

*Ms. Shahr Bano Malik**

For centuries, contributions of women in scientific fields have remained under-acknowledged or underrepresented. Gender equality in professions and academics has remained a challenge in history, not due to the incompetence or incapacity of women but owing mainly to stereotypes about images associated with different genders, or their accepted roles and responsibilities.

However, things have changed for the better over the past few decades as the roles of women started evolving. Trail-blazing women in different fields overcame social, cultural, economic barriers, clichés and stereotypes, opening avenues for many to come. A lot of what is possible today for women is owed to the trendsetting women; significance, therefore, of strong role-models cannot be overemphasized.

From education to science, research to engineering, health to business, literature to architecture, leadership and governance, women are getting ahead in every sector. Many barriers, however, still persist for women in professional pursuits including those in STEMM fields, irrespective of their intelligence or qualification. However, a disproportionately small number of them get in their careers the eminent, higher and decision making roles (like CEO, Executive Director, Managers, Heads, etc.) in institutions and organizations. Their ratio in politics or other managerial positions is less than half of the total in America, according to a report published by American Association of University Women (AAUW), a US-based NGO. The same trend exists for academic leadership of women in US where only 30% women hold the offices of college presidents, 32% are full professors and only 16% women are medical school deans. Moreover, the percentage of female writers and directors in Hollywood is only 12.6%. These statistics come from US where human rights and women empowerment are highly advocated. Trends in many developing and under-developed countries present a far worse picture.

A study[i] comprising large-scale bibliometric analysis of gender differences in scientific careers that traces the publication careers of almost six million male and female researchers during the period 1996-2018 reveals an increasing trend in the percentage of women starting a career as publishing researcher – 33% in 2000 to about 40% in recent years. However, the study shows that within male and female researchers that started their publication career in the same year, women seem to be somewhat less likely to continue their career as publishing researcher than men. It is also observed that men produce on average between 15% and 20% more publications than women. Moreover, in biomedical disciplines, men are about 25% more likely than women to be the last author of a publication, suggesting the former's seniority in the group of authors.

More concrete and consistent efforts are required to break barriers and prejudices impeding parity. For the purpose, the 17 interlinked Sustainable Development Goals (SDGs), adopted worldwide, offers right path for reaching the equality for both genders at each and every level. In particular, SDG2 (Zero Hunger), SDG3 (Good Health and Wellbeing), SDG4 (Quality Education), SDG8 (Decent Work and Economic Growth), SDG10 (Reduced Inequalities) and SDG16 (Peace, Justice and Strong Institutions) cannot be achieved fully without achieving the Goal 5 related to "Gender Equality". Achieving Sustainable Development Agenda by 2030 calls for reducing gender gap in all walks of life, including science, technology, and innovation. Equal opportunities and increased participation triggered by inspirational stories from the history can motivate more young women to pursue careers in science.

To celebrate women and their achievements in different spheres, International Women's Day is observed each year on 8th March. This day not only highlights the significance of women's role for building sustainable societies but also raises awareness for reducing gender gaps. The International Women's Day 2022 calls for deepening the understanding of role, history and future of women in Science.

Here, we take a look at some notable historical women figures in science

** Ms. Shahr Bano Malik is an enthusiastic new member of COMSATS Secretariat human resource. Ms. Malik has a degree in Bioinformatics from COMSATS Centre of Excellence in Pakistan, COMSATS University Islamabad. Currently assisting COMSATS Telehealth Desk at COMSATS Secretariat, she has keen interest in digital health, and SDGs, especially those with targets focusing on inequalities, mental health, climate action, and gender equality.* **Email: shaher@comsats.org**

belonging to COMSATS' Member States, who despite many challenges of their time, endeavored to bring the much needed change and make great contributions in their respective fields.

Sameera Moussa

A remarkable lady of 20th century, Sameera Moussa is the first female nuclear physicist of Egypt. Born in 1917, Dr. Moussa attended Cairo University from where she earned a Bachelors' degree in radiology and later PhD in atomic radiation. She became the first female to earn a doctorate degree and also the first one to hold a university post at the same institute.

She devised a historic equation for splitting atoms of cheap metals, such as copper – the invention that has helped pave the way for developing a cheap nuclear bomb.

However, Moussa always advocated for peaceful use of nuclear energy. She is known for her motto "Atoms for Peace" and dedicated her nuclear research for finding ways to make nuclear technology a safer and affordable tool for medical treatment. "My wish is for nuclear treatment of cancer to be as available and as cheap as Aspirin", dreams Dr. Moussa.

She also organized the Atomic Energy for Peace Conference and sponsored a call that set international conference under the banner of "Atoms for Peace". She died in 1952 at a very young age in a car accident. She is still remembered with the title "Mother of Atomic Energy"[ii].

Azar Andami

An Iranian physician and bacteriologist, Azar Andami is known for her development of cholera vaccine. Born in 1926, Andami started her career as a teacher working for the Iranian Ministry of Culture. Subsequent to receiving natural science diploma in 1951, she received a degree of Doctor of Medicine from the University of Tehran in 1953. After specialization in gynecology, she enrolled herself in Pasteur Institute of Iran and later moved to Paris for further studies in the field of Bacteriology.

She died in 1984 and is a great motivational figure for the women of Iran till date[iii].

Cicely Williams

A remarkable Jamaican physician, Dr. Williams is celebrated for her discovery of kwashiorkor and campaign against the use of "sweetened condensed milk" alongwith other artificial baby milks as a substitute of human breast milk.

Dr. Williams was born in 1893 and studied Medicine from the Somerville College, Oxford, where she was one of the first females admitted into the course only because of the dearth of male students caused by World War I. After her graduation from University of Oxford, she practiced medicine at King's College Hospital and Queen Elizabeth Hospital for Children in Hackney.

Devoted to the advancement of the field of maternal and child health in developing countries, Dr. Williams became the first Director of Mother and Child Health (MCH) at the newly created World Health Organization (WHO) in 1948.

During her extraordinary career full of hard work and achievements, Dr. Williams served over 50 countries as a doctor, researcher, lecturer and consultant and was also elected as an honoree fellow of King's College Hospital Medical School. She died in 1992 at the age of 98.

Akkagaz Doszhanova

Like other regions of the world, women of Central Asia have also struggled in the past for stepping ahead in different walks of life. Akkagaz Doszhanova is one such example who turned into a role model and strong motivator for the women of Soviet Central Asia during 19th and 20th century.

Born in 1893, Doszhanova was expected to marry in an early age with no opportunity of higher education. Fighting obstacles along her way, she succeeded in becoming the first Kazakh woman in Central Asia to graduate from a Soviet university with a degree in medicine. During her brief lifetime of 39 years, she provided free nursing and midwifery classes to women at the Children's City Hospital and also treated thousands of children in famine stricken areas.

She dedicated her efforts to her profession and to her role as a social activist. In 2016, West Kazakhstan State Medical University honored her legacy by bestowing her name on its new concert hall and erecting a bust in its plaza[iv].

Trinidad Perez Tecson

Very few women in history are known for their valiance, bravery and heroic roles in the battlefields. Trinidad Perez Tecson of Philippines is one such woman who fought a number of battles alongside men for the freedom of her country from Spanish colonizers. Tecson was born in 1848 and fought 12 bloody battles, including the famous one, i.e., Battle of Biak-na-Bato during which her valor earned her the title of "Mother of Biak-na-Bato" and "Mother of Mercy.

Besides, she also provided nursing services to many injured Filipino soldiers due to which she was awarded the title of "Mother of the Philippine Red Cross". This iron lady, a huge motivation for other females of her time, died in 1928[v].

Safiye Ali

Born in 1894, Safiye Ali was the first female medical doctor of Turkey who is also known for her welfare services during the Balkan Wars, World War I, and the Turkish War of Independence, where she treated wounded soldiers. After graduating from Robert College in Istanbul, Safiye moved to Germany in 1916 for specialization in gynaechology and pediatrics. In 1923, she got her license as the first female doctor and opened her clinic in Cağaloğlu.

Safiye Ali was not just a clinical doctor, she also made history as the first female lecturer to teach gynecology and obstetrics to girls at the first girls' medical school established within the American College.

During her profssinal career, Safiye faced a number of harrassment issues from her male colleagues through which she persevered overcoming a number of hurdles in her career including baseless accusations. She died in 1952 due to cancer[vi].

References:

i. https://doi.org/10.48550/arXiv.2106.12624
ii. https://insidearabia.com/sameera-moussa-egypts-first-nuclear-scientist/
iii. https://peoplepill.com/people/azar-andami
iv. https://www.aramcoworld.com/Articles/September-2021/Dr-Akkagaz-Doszhanova-Woman-of-the-Steppe-Pride-of
v. https://pvao.gov.ph/pvao-gad-updates/trinidad-tecson/
vi. https://www.dailysabah.com/feature/2014/12/09/first-female-physician-of-turkey-safiye-ali

...continued from page 12

Egypt's economic reform, COP27, and UK-Egypt working relations were also discussed during the meeting.

Speaking during the meeting, the Egyptian Minister expressed Egypt's desire to strengthen triangular cooperation and South-South cooperative relations with the UK especially for climate technology for Africa. She highlighted the UK's commitment towards this cooperation through technical and economic support in different areas in recent past.

Scientists from NTU-Singapore Develop Recyclable Pollen-based Paper

The conventional paper industry is responsible for 33 to 40% of all industrial wood traded globally, and adds to the global problem of deforestation and rising carbon emissions. To overcome such negative environmental impact, scientists at Nanyang Technological University (NTU), Singapore, have developed a non-allergenic pollen-based paper that can be printed-on and erased multiple times without damaging the paper.

The study has been published online in Advanced Materials on 5 April and a patent has been filed based on this innovation (NTU; 5th April 2022).

Prof. Cho Nam-Joon, senior author of the paper and the team lead, stated that apart from being easily recyclable, the pollen-based paper is also highly versatile. Unlike wood-based conventional paper, pollen is generated in large amounts and is naturally renewable, making it potentially an attractive raw material in terms of scalability, economics, and environmental sustainability.

Scholarships/Fellowships for Member States by COMSATS' Centres of Excellence

Students from COMSATS' Member States are welcome to benefit from the following offers from COMSATS' Centres of Excellence:

- Hundred (100) scholarships for students/researchers for postgraduate studies at all campuses of COMSATS University Islamabad (CUI), Pakistan.
- Five (05) post-graduate scholarships, for Masters of Science in Mathematics at Lahore Campus of COMSATS University Islamabad (CUI), in collaboration with the International Centre for Theoretical Physics (ICTP), Italy.
- Five (05) post-doctoral fellowships at the International Center for Chemical and Biological Science (ICCBS), Pakistan.
- Five (05) post-doctoral fellowships at the National Research Centre (NRC), Egypt.
- Two (02) PhD scholarships at the Al-Farabi Kazakh National University (KazNU), Kazakhstan.
- Long-term (1-2 years) and short-term (less than 6 months) fellowships for foreign scholars for collaborative research at Tianjin Institute of Industrial Biotechnology (TIB), Chinese Academy of Sciences.

For further details on the scholarships, please visit www.comsats.org or write to farhan@comsats.org.

TWAS-ICCBS Postgraduate Fellowship Programme

The International Centre for Chemical and Biological Sciences (ICCBS), Pakistan, and The World Academy of Sciences (TWAS), Italy, are inviting applications from developing countries (other than Pakistan) for a research fellowship of 6 – 12 months in chemical/ biological sciences.

Fields of study: organic chemistry, biochemistry, biotechnology, molecular medicine, pharmacology, physical chemistry/ analytical chemistry.

Deadline: 4th July 2022

For further details, visit:
https://twas.org/opportunity/twas-iccbs-postgraduate-fellowship-programme
or e-mail at **fellowships@twas.org** | **hej@cyber.net.pk** | **pcmd@cyber.net.pk** | **protocol.iccbs@iccs.edu**

COMSATS Network of Centres of Excellence

BCSIR-Bangladesh www.bcsir.gov.bd
Embrapa Agrobiologia-Brazil embrapa.br/agrobiologia
ICCES-China english.icces.ac.cn
TIB-China english.tib.cas.cn
CIF-Colombia www.cif.org.co
NRC-Egypt www.nrc.sci.eg
UTG-The Gambia www.utg.edu.gm
CSIR-Ghana www.csir.org.gh
ITS-Indonesia www.its.ac.id
IROST-Iran www.irost.org
ICENS-Jamaica www.icens.org
KazNU-Kazakhstan www.kaznu.kz/en/
RSS-Jordan www.rss.jo
ICCBS-Pakistan www.iccs.edu
NMC-Nigeria www.nmc.edu.org
CUI-Pakistan www.comsats.edu.pk
AQU-Palestine www.alquds.edu/en
UCAD-Senegal www.ucad.sn
ITI-Sri Lanka www.iti.lk/en
IRCC-Sudan www.ircc.gov.sd
HIAST-Syria www.hiast.edu.sy
TIRDO-Tanzania www.tirdo.or.tz
CERTE-Tunisia www.certe.rnrt.tn
TÜBITAK-Turkey www.tubitak.gov.tr/en