Malta Conferences Foundation, 10th Anniversary Conference: "Knowledge and Society"—MALTA X focus

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The Malta Conferences Foundation (MCF) is a non-profit NGO association that was founded by Prof. Zafra Lerman as the chair of the Subcommittee on Scientific Freedom and Human Rights of the American Chemical Society (ACS) after 9/11, 2001. MCF aims to promote science diplomacy and chemistry in the Middle East and North Africa (MENA) countries, reaching both regional and national scientists, engineers, consultants, entrepreneurs, educators, media, and researchers from governments, corporations, and academia. MCF offers a science forum for the creation, dissemination, and utilization of knowledge among MENA stakeholders, providing the scientific community and public policy makers with a platform to exchange, discuss and harmonize their ideas in respect to the growing interdependence of science with society. In accordance, MCF has established a series of conferences, taking place biennially in Malta and in other countries, covering the organizational costs and the expenses of selected participants in order to facilitate participation from all Middle East countries, as well as Morocco, and Pakistan. The preparatory tasks of the conference are coordinated by a secretariat, providing continuous access to contact information in-between the conventions, while a Steering Committee selects the principal themes, satellite events and special sessions to be held at the upcoming Conference.

The Conferences are designed based on the following principles and objectives:

1. To provide a forum for dialogue on challenges of science and to communicate science and its basic values to societies at large
2. To promote the mutual understanding of different cultures through scientific dialogue
3. To promote education and distribution of knowledge wealth among the social groups within the various countries in the MENA region
4. To give the participants the possibility to exchange their views regarding the relationship between science and society.

Celebrating the 10th Anniversary of the Malta Conferences

In 2022, marking the 10th anniversary of the MCF series, the Malta X Conference took place in Malta, November 6-11, 2022, focusing on **"Knowledge and Society"**. During the 5 days conference, more than 100 participants, representing 15 different Middle East countries, Morocco, Pakistan, few representatives from Europe and the US, took part in the event.

The opening ceremony, attended by His Excellency Dr. George Vella, the President of the Republic of Malta and other dignitaries, was followed by keynote addresses by Nobel Laureates, Peter Agre and Aaron Ciechanover and other distinguished scientists. After which, scientists, leaders in government, industry, and NGOs, and the media discussed problems, solutions and challenges to environmental and educational problems common to the region.

Topics and workshops

62 presentations were made under six different workshops, including:

- Water, Energy and Food Security (WEF) Nexus
- Nanoscience, Nano-bioscience, and Nanotechnology
- Medicinal, Organic and Biochemistry, Biophysics, and Biotechnology
- Women in Science
- Chemical, Biological, and Nuclear Security
- Science and Technology Education at All Levels

Water, energy and food security (WEF) nexus

A workshop was devoted to in depth discussion of climate change and impact on water, energy and food security (WEF) nexus, crystallizing the action required on a regional scale, regarding WEF and the connection between regional stability and food security, to fight hunger and food shortage and possible ways to mitigate its worst effects.

Sessions

- Climate, Water Scarcity in a Conflict Region
- WEF Overview & WEF Issues
- Water and Wastewater Treatment &Water Reuse
- Energy: Photovoltaic and Desalination

Objectives

- Raising awareness on Water, Energy, Food (WEF) Nexus and societal impact
- Assessing impacts of climate change and adaptation strategies.
- Analytical tools and technology to identify risks related to WEF
- Resolution of conflict on cross-border co-operation.

The participants of the Malta X Conference. First row, from left to right: Ehud Keinan (President-elect of IUPAC), Agnes Von Der Muhll (French ambassador to Malta), Omar Rifai (Advisor to His Royal Highness Prince El Hassan bin Talal of Jordan), Dr. George Vella (President of the Republic of Malta), Zafra Lerman (MCF President), Peter Agre (2003 Nobel Prize in Chemistry), Frederique Dumas (Former member of the French parliament)

Highlights of the Workshop

- Adverse impact of climate change on WEF
- Regional cross-border and cross-sector collaborations on WEF
- Drinking water quality, wastewater and sanitation aspects and treatment of emerging pollutants
- Ultra-filtration, Nano Technology and molecular biology
- Brackish water desalination, brine treatment and disposal
- Untapped renewable energy resources and agri-voltaic systems

Nature-based solutions

- Use of local materials for water and wastewater treatment towards a more circular economy
- Engineering practices that introduce natural features to promote adaptation and resilience.

Challenges and Potential Collaboration

- The severity of the impacts of climate change and the speed at which the changes are occurring.
- The urgency and dedication that will be required to manage water in an already changing climate. Business as usual is not an option if we are to achieve the UN SDGs and climate targets
- Degradation of emerging pollutants in aquatic ecosystems, and atmospheric dust deposition
- Region sustainable livelihood, engaging academia, NGOs, women, businesses and corporates.

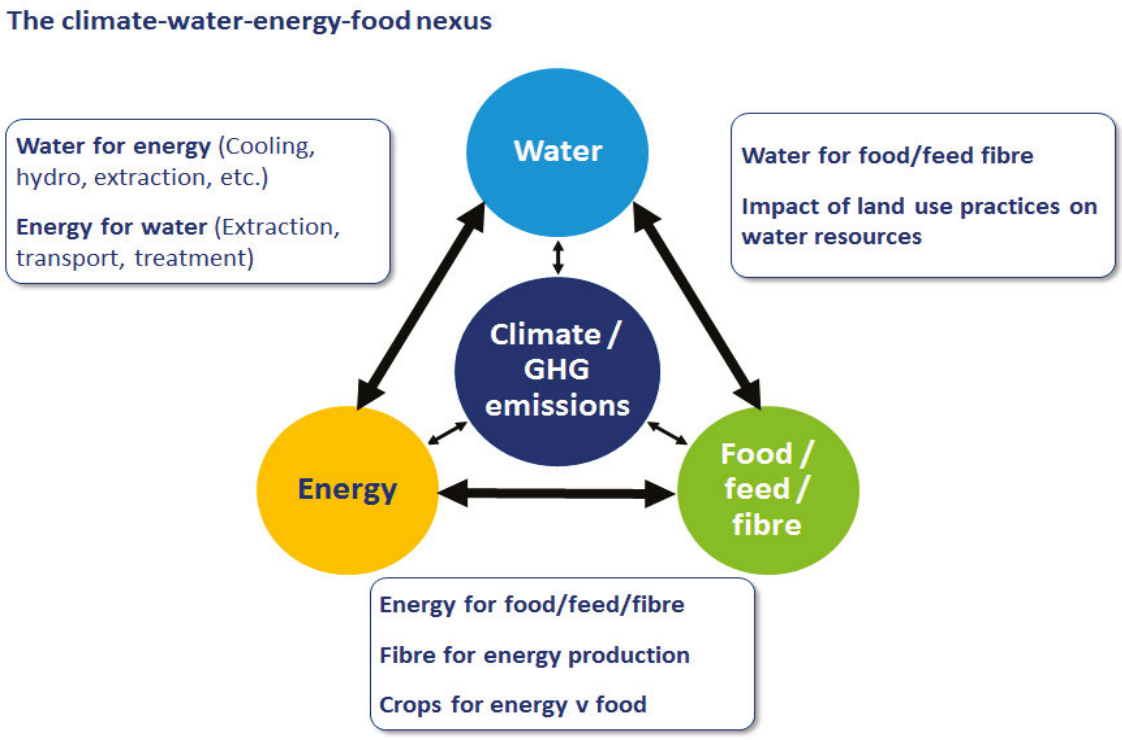
Nanoscience, Nano-bioscience, and Nanotechnology

Objectives

- Enhancing plural and multi-disciplinary R&D
- Innovative polymers and nanotechnology research

Highlights of the Workshop

- Bioactive glass nanoparticles (NPs) for bones applications and gelatin NPs for drug delivery



Climate, Water, Energy, Food Nexus Diagram. UN 2050 Projection: water +80%; Energy: +55%; Food: + 60% (Source UN, FAO 2011)

- Polymers for detection of bacteria and Carbon nanostructures for heavy metal detection
- Polymers for iodine capture
- Immobilized Catalysts for CO2 capture
- Ultrafast spin transport via Molybdenum sulfide
- Protein-based metal sensors and cost-effective paper-based sensors

Challenges and Potential Collaborations

- Sustaining collaboration caused by lack of funding
- Collaboration to enhance research quality expanding plural and multi-disciplinary expertise
- Production of materials for potential applications
- Guidance on intellectual property and technology transfer
- Medicinal, Organic and Biochemistry, Biophysics, and Biotechnology

Objectives

- Cross-border collaboration in research and development
- Entrepreneurship stimulation

Highlights of the Workshop

- Platinum (IV) - hydrazide Complexes, as potent lipoxygenase inhibitor
- Therapeutic monoclonal antibodies and antibody fragments to transit from full length immunoglobulins to antibodies mimetics
- SARS-CoV-2 Spike WT structure and O-micron protein trimer and its receptors that may affect entry into human cells
- vitamin D and C- Reactive Protein CRP reaction with COVID- 19 in older Iraqi patients
- Lipid binding, neuronal membrane, oxidative stress and molecular crowding effects on amyloid aggregation
- Microscopic evidence for malaria parasites in viscera tissues of the Medici family
- Challenges and Potential Collaborations
- How to translate scientific ideas into a collaborative and business
- Natural product drug discovery, a model of cross-border collaboration in research

Women in Science

Objectives

- Women's role in scientific research and technology
- Education and dissemination of knowledge wealth among women within MENA region

Highlights of the Workshop

- Gender (in) equality and persisting gaps in STEM Education in the Middle East workplace
- Obstacles that hinder gender equality in STEM education; societal roles, resources, and educational structure and curriculum
- STEM pedagogy based on critical thinking and creativity rather than the traditional learning
- Women faculty membership discrimination and bias identification and causing factors
- Gender Gap in Mathematical, Computing, and Natural Sciences

Challenges and Potential Collaborations

- Advancing training of women chemists, their research needs and technology transfer abilities
- Creation of equal opportunities for women so they can choose what they want to do, in a gender-bias free family; societal and educational environment
- Quotas granting to females in colleges in STEM.
- Organization of summer camps for young school students involving attractive STEM courses
- Equitable funding resources allocation to men and women

Chemical, Biological, and Nuclear Security

Objectives

- Organisation for the Prohibition of Chemical Weapons (OPCW) Knowledge, Ethics and Responsibility
- Ethical aspects and responsibility of the decision-makers.

Highlights of the Workshop

- Chemical and Biological Weapons Convention and Challenges
- Significance, relevance, and responsibilities of chemical science on the prohibition of chemical weapons on a regional and a global scale
- Theoretical knowledge and practical chemistry knowledge for screening and identifying chemical warfare agents
- Degradation of toxic chemicals and biological products and procedures to control and coordinating emergency response
- Health effects of exposure to chemical weapons

Challenges and Potential Collaborations

- Peaceful uses of chemistry, emphasizing international cooperation and capacity-building
- The global endeavor to permanently eliminate chemical weapons,
- New threats and risks and protective measures against these weapons

Science and Technology Education at All Levels

Objectives

- Technical and scientific research, technology and education required for the development of human resources and institutional capacities
- To promote education for dissemination of knowledge wealth among the social groups within MENA region.

Highlights of the Workshop

- The Palestinian-German Science Bridge: Connecting people and knowledge. A pilot project to create a nucleus for the development of national science & technology infrastructure in Palestine.
- COVID-19 pandemic impact on dental education at Alexandria University, combining virtual simulation followed by physical lab activities
- COVID 19 Pandemic - E-and Media-learning of chemistry. The pros and cons of the sudden implementation of the online teaching and learning chemistry, at all levels.
- Natural science courses for freshman at Sabana University, Turkey. Structuring learning tools, considering size of the class, student heterogeneity for a seamless integration of teaching.

Challenges and Potential Collaborations

- Changing the dynamic culture of young children in terms of gender equity and inclusivity.
- Borderless collaboration, to exchange experiences and problem-solving
- Critical thinking and creativity rather than the traditional memorizing learning.
- Organization summer camps for young school students (male and female)
- Today's students as tomorrow's scientists and leaders need to learn chemistry and its links to climate change and UN SDGs.

Side Events

Entrepreneurship

Driven by the coronavirus, the climate crisis, the regional economic crisis, on the one hand, and the windows opened by the Abraham accords (normalization agreements between Israel, the United Arab Emirates, Bahrain and Morocco) and the Cypriot-lead regional

climate action plan, on the other, the participants were coached to work together on opportunities and challenges ahead; to discuss how science can contribute to opening new paths for business innovation and policy making. Groups of 5 - 7 participants were formed to discuss challenges derived from the presented research works, emphasizing:

- the effectiveness of current and proposed research to build a sustainable future
- the importance of knowledge in managing the future of the region's economies and societies.
- connecting people through opportunities that are economically worth their while
- identifying collaborators to initiate interdisciplinary research, raising funds and capturing the interest of entrepreneurs and policymakers for support

Early Career Program (ECP)

Networking, mentoring and learning opportunities were provided by the ECP for professionals aged 35 and younger, supporting career advancement through communication and exchange of ideas among them; to learn and to actively connect the leaders of tomorrow and the emerging chemistry professionals with established professionals; to transform their careers through the sharing of knowledge, contacts and experiences. Over the years, the ECP has become well organized and as such has a positive impact in integrating young professionals into the global chemistry community. Hundreds of early career professionals have passed through the MCF events and activities.

COP27 Climate Change Conference

In parallel to Malta X, the UN Climate Change Conference 2022 in Sharm El-Sheik, Egypt, hosted policymakers, environmental activists and business executives, including several long-time Malta participants, to discuss urgently needed action on the climate crisis, in regard to poverty, infectious disease, forced migration, and conflict.. The primary focus was to reduce emissions so that global temperature rises are kept to below 1.5 °C, a harm that is already severe and critical in the vulnerable MENA region. A commitment was made to create a "loss and damage" fund to help the global south recover from the devastating effects of increasingly extreme weather events, reducing their greenhouse gas emissions.

IUPAC Water in the Middle East Conference

IUPAC through ChemRAWN Committee intends to hold a conference on water scarcity and water problems and solutions in MENA. A preliminary session was held in which Malta X participants discussed and suggested objectives and topics to be addressed in the conference, including:

- To develop a holistic approach to deal with the energy-water-climate nexus in MENA region
- To form a regional framework for continuous information exchange on climate change impacts and adaptation
- The impacts of climate change on water resources and the associated vulnerability and integration into sustainable development planning
- Best techniques and practices adjusted to drought and flood management and the environment
- Management of food production, rangelands, soil, water and eco-systems conservation.
- Digital and AI technology
- Knowledge gaps, opportunities and recommendations for researchers and policy makers on short and long-term vulnerability to climate change and water resource scarcity.

Concluding Remarks

The success of the Malta Conference series proves that the original idea and intention behind this initiative is becoming a reality. Scientists, decision-makers and representatives of civil society use the MCF platform for conducting fruitful dialogue on burning issues affecting the scientific community and MENA society. The growing interest in MCF shows that there is a growing consensus that the Malta Conferences has become the leading event of regional science diplomacy. It was generally agreed that the Malta X conference with its impressive participation, and a comprehensive program was a complete success. The conference ended with the conviction that professionals can be agents of change through co-operative innovation, and collaboration. The participants were enthusiastic to begin the work of building on all that was shared and achieved.

Acknowledgments

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