5TH

ARAB WATER FORUM

المنتدى العربي الخامس للمياه

Arab Water Security for
Peace & Sustainable Development

Final Report

23-21 September, 2021

Dubai, UAE

المجلس العربي للمياه
Arab Water Council

UNITED ARAB EMIRATES
MINISTRY OF ENERGY & INFRASTRUCTURE

وزارة الموارد المائية والرى
جمهورية مصر العربية
Ministry of Water Resources and Irrigation
Arab Republic of Egypt

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Fifth Arab Water Forum

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Acknowledgement

The General rapporteur of the forum would like to take this opportunity to thank H.E. Dr. Mahmoud Abu-Zeid, the president of the Arab Water Council for his leadership in organizing the fifth Arab Water Forum and making it continuation of the successes marking all events organized by AWC. His encouragement and support to every person participated in the organization of the event was the real driver to make the event to reach a higher level success. Thanks also to Dr. Hussein El-Atfy, the secretary General of AWC, who tirelessly worked over long months to bring all parties together. A special vote of thanks is for Dr. Khalid Abu Zeid, in his capacity as the head of the Organizing Committee for his remarkable effort all through the forum organization and for all session conveners, Chairs, Moderators and Rapporteurs for their appreciated cooperation. Acknowledgement also goes to each member of the Organizing Committee particularly Ms. Mervat Hassan, Ms. Sherin Youssef, Dr. Mary Halim and Ms. Manal Hassan.

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Dr. Safwat Abdel-Dayem
General Rapporteur
Fifth Arab Water Forum

Abbreviations

AOAD	Arab Organization for Agriculture Development
AWA	Arab Water Academy
AWC	Arab Water Council
CEDARE	Center for Environment and Development for the Arab Region and Europe
CIHEAM	International Centre for Advanced Mediterranean Agronomic Studies
EAD	Environment Agency Abu Dhabi
EWP	European Water Partnership
FAO	Food and Agriculture Organization of the United Nations
GERD	Great Ethiopian Renaissance Dam
ICARDA	International Center for Agricultural Research in the Dry Areas
ICBA	International Center for Biosaline Agriculture Center
ICID	International Commission on Irrigation and Drainage
ICRC	International Committee of the Red Cross
IWMI	International Water Management Institute
MEI	Ministry of Energy & Infrastructure, UAE
MHUUC	Ministry of Housing, Utilities and Urban Communities, Egypt
MWRI	Ministry of Water Resources and Irrigation, Egypt
NRD-UNISS	Desertification Research Centre – University of Sassari
NWRC	National Water Research Center
LAS	League of Arab Countries
SDGs	Sustainable Development Goals
SNG	FAO Sub-regional Office for the Gulf Cooperation Council States and Yemen
SEI	Stockholm Environment Institute
TU Delft	Delft University of Technology
UAE	United Arab Emirates
ESCWA	United Nations Economic and Social Commission for Western Asia
UNCED	United Nations Conference on Environment and Development
UNICEF	United Nations International Children›s Emergency Fund
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNEPFI	United Nations Environment Programme Finance Initiative
UNDRR	United Nations Office for Disaster Risk Reduction
WB	World Bank
WFP	World Food Program

Executive Summary

The 5th Arab Water Forum was convened by the Arab Water Council during the period 21 – 23 September 2021 in Dubai, EAU under the patronage of the United Arab Emirates' Ministry of Energy & Infrastructure and the sponsorship of the League of Arab States (LAS) and the Ministry of Water Resources and Irrigation of Egypt (MWRI), in collaboration with national, regional and international partners. The Forum adopted the slogan ***"Arab Water Security for Peace and Sustainable Development" through three main themes, namely: Arab water security, cooperation in transboundary water, and water for sustainable development. It was accompanied with a "Regional Dialogue for the Safe Reuse of Treated Wastewater to Face Water Scarcity Challenges in the Middle East and North Africa"*** as a side-event organized by IWMI /CGIAR, AWC, FAO RNE & LAS. A 3-days exhibition was a part of the overall forum organizion.

The forum witnessed unprecedented gathering of Arab and international water ministers, top officials, water experts, private-sector representatives and intensive media coverage. The forum sessions with so rich with high quality presentations and discussions around the latest developments in policies, knowledge and innovations. The forum themes triggered great agreements and commitments towards the need to speed-up and intensify efforts by all, to achieve the sustainable development goals (SDGs) across the Arab region despite of water scarcity and threats brought-in by climate change. Cooperation on transboundary water has been recognized by all as indispensable and key for peace and regional stability. Focus on the human factor emerged as a must in all development interventions, if sustainability is the target.

The outcome of the forum's 24 sessions is reflected in important recommendations and messages targeting politicians, decision makers, developers, managers, researchers, private-sector, and the public at large. The common conclusion is: "Water is the heart of life a basic element of economic stability and a pillar of sustainable development". Thus, policies and actions should be centered on water security otherwise existence on this planet, not only the region will be at stake. For this reason, the messages of the forum will carry this conclusion to the whole world at the 9th World Water forum to be held in Dakar, Senegal in March 2022.
A full account of the 5th Arab Water forum recommendations and messages are given at the end of this report. The main highlights as related to the three themes of the Forum are summarized by the following statements:

Water Scarcity

- Water-related challenges in the Arab region will increase and become more stressful with the growing demands and water resources scarcity. Dwindling water supplies mean human suffering and an increased risk of instability, conflict and migration.
- Aggravated by climate change water scarcity will have implication on human security, socio-economic security, water and food security giving way to unregulated and uncontrolled urban expansion which is highly water consuming. Future effects of climate change will impose further pressure on water availability disrupting the efforts made to achieve water security.
- Climate change is a transboundary issue and as such regional collaboration is needed to address climate security. Addressing water and climate change together will need considering multiple critical dimensions and risks.
- Knowledge and success stories sharing between the Arab countries and cooperation in water conservation strengthen Arab water security.
- Water security is conditioned by diversified water sources both conventional and non-conventional to achieve a balance between water supply and demand in the Arab region. Construction of new desalination facilities using modern technology can make difference in facing the challenge of water scarcity. Reuse of domestic wastewater and agricultural drainage water provides more interesting prospects for the future, especially for agricultural production.
- It is vital to take into account the environmental impacts associating desalination and wastewater reuse, and take the necessary mitigation measures to ensure sustainable development of these resources.
- Arab countries need to get together through partnerships and regional projects on wastewater reuse. Effort is needed to develop a business case to promote sustainable wastewater reuse.
- As water use is intricately linked to food production and the region is facing a food security crisis, there are needs for more innovative thinking on how to use unconventional water sources in agriculture and food production.
- The Arab region can bridge the gap of food production for food security by simultaneously working on making water resources available, working on agronomy for more crop per drop and efficiency for more crop per kilowatt and per unit land, as well as adaptive approaches putting in place innovative solutions.
- The interlinkages and dependencies between Water Security, Food Security, Energy Security and Climate Security need to be addressed in national water strategies in a nexus approach which takes into consideration the socio-economic differences in the society.
- Regional and global experiences show that knowledge, technology, policy and institutions need to evolve together to achieve water security.

- LAS and AWC together with support from the development partners can effectively assist the region to bridge the water and food gaps and address the water and food security challenges.

Transboundary Water Cooperation

- Water in a river basin is a natural cycle which appears both as Blue Water in streams or Green Water in vegetation. Water security for countries depending on transboundary water, means fair and equitable share of benefits of both “Green Water” and “Blue Water”.
- Water flow in rivers does not recognize political boarders and no one being a tribe, community, sector or state can claim ownership of water in a shared river basin.
- About 64% of the total available renewable surface water resources in the Arab region, are transboundary. All Arab countries sharing transboundary water resources face unresolved challenges with the upstream riparian countries putting their water security at great risk.
- Water of transboundary rivers should be an opportunity for cooperation and not a reason for conflicts. Negotiation about equitable shares should not be politicized and remain technical seeking for opportunities of mutual benefits, development and economic growth for all.
- The most prominent challenge threatening sustainable development in Egypt and Sudan is the construction of the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile threatening the life’s of more than 150 million people.
- Egypt and Sudan are interested in re-engaging in serious negotiations within fixed timeframe to conclude a binding agreement on the filling and operation of the GERD. Fruitful negotiation is the one based on exchanging benefits, placing “humanity” at the center of the water issues.
- Iraq and Syria also face similar problems with the upstream countries of the Euphrates and the Tigris. Turkish measures reduced the flow to serious levels that endangered the livelihood of the population and the biological diversity of the ecosystem in Iraq. Restoration of the flow is a matter of letting millions of people’s life to go on.
- Cooperation let all countries benefit from the shared basin resources without prejudice to the water rights of any country in the basin.
- A promising way for joint cooperation between riparian countries is to establish a body at the basin level to boost cooperation in various fields of water, food and energy, to enhance their economic, cultural and scientific relationships as in the successful case of the Senegal river.
- It is time to pursue legal frameworks of international cooperation on transboundary water governance - similar to Resolution 64/292, of the United Nations General Assembly which recognizes water and sanitation as a human right. Cooperation

in shared waters must be strengthened and laws must be enforced to obligate upstream countries not to violate the water rights of downstream countries.

- A strong interest is demonstrated for forming an advisory body as a "Water Diplomacy Council", under the umbrella of LAS to support the Arab countries when negotiating transboundary water issues. The Arab Water Council with its rich expertise can perform the task of formulating programs for such body. The Arab Water Academy can play the training and capacity building role in water diplomacy.
- An alliance of downstream countries is proposed to work as a knowledge-motivated driver and a powerful tool in defending their water rights in the international arena emphasizing its socio-economic and humanitarian aspects of shared water resources.
- Empowered civil society and non-governmental organizations can play a major role in supporting the governmental efforts to bring the riparian countries together at one negotiating table and help convergence of views, building partnerships and moving beyond the technical and political issues.

Water for Sustainable Development

- Although the Arab region made important achievements that should be celebrated, immediate sustainable water management actions are needed in the region that faces extraordinary water scarcity and a number of other compounding risks and challenges.
- Water scarcity needs to be better understood in a comprehensive context of sustainable development. Regional efforts and cooperation should highlight the importance of water as a key to security, safety, and peace.
- Policy and planning approaches for water and sustainable development should be built on the "5-Is" principal: integration, innovation, information, infrastructure resilience and institutional reform.
- The region is not on track for achieving the 2030 SDGs. In order to achieve SDG-6 on water and other water related SDGs, the region needs to quadruple its existing efforts by increasing investments in water projects to accelerate the pace towards achieving the SDG targets.
- Nature is an important partner for humans in the need for water for its key role in achieving sustainability. Its share must be taken into account when drawing up water management plans and strategies for the sake of human health and environmental safety and the achievement of the 2030 SDGs.
- Sustainable development needs "Water Accounting" for understanding the key trends in water uses and sources and monitoring every drop of water.
- Sustainable agricultural water management requires knowledge and experience on best practices of investment in irrigation at the smallholder scale in the Arab Region.

- An important lessons learned when using reclaimed water for irrigation is to always consider the final user behavior along with the quality of effluent in terms of water management, crop type and safety measures.
- Innovations and smart technologies will advance water sustainability and resilience to climate change either through improving the water use efficiency or developing alternative resources.
- Smart financing approaches and tools should be promoted to reward research and development initiatives in water related innovations and technologies (Water Hub).
- More investments are needed in capacity building programs, technical trainings and educational scholarships in the water sector.
- Humanity should be taken into consideration when discussing water management in social, cultural, economic and political contexts.
- Involvement of NGOs and the civil society in water issues helps in building a comprehensive "humanitarian" view that includes everyone, supports the concept of "right to water" for everyone, and seeks symbiotic relationship between water security and sustainable development.
- Empowered women are active agents of change, counteract gender inequalities, and build resilient livelihoods in the context of water security for both men and women.
- The role of young people needs to be elevated in this process and they need to be engaged and integrated through key roles in decision-making.
- Water and water services in Arab countries which are suffering from political conflicts and civil wars reached levels beyond misery especially for the elders and children. Immediate actions are required to cancel all coercive measures and restore minimum decent life for the people to access clean and safe water, particularly in the time of the global pandemic of Corona virus (Covid-19).
- Development actors need to place greater emphasis on building the resilience of Water Supply and Sanitation (WSS) service providers in pre-crisis and during protracted crisis wherever possible. A major driver of decline in services during protracted crisis has been the lack of attention paid by development partners to resilience building prior to crisis.

Introduction

The Arab Water Council (AWC) mission is to promote deeper understanding and better management of the water resources in the Arab states in a multi-disciplinary, non-political, professional and scientific approach, to disseminate knowledge and enhance sharing of experiences, to achieve integrated water resources management for sustainable development and to promote good water governance for the benefit of the Arab people.

The series of triennial Arab Water Forum (AWF) is a principal activity for implementing the mission of the AWC. It is considered the most important water-related event in the Arab region. The AWFs provide a platform for bringing together Arab water community leaders, decision-makers and water stakeholders to discuss and find solutions for the water challenges facing the Arab region. The AWF creates conditions favorable for dialogue and collaboration, in particular through sharing knowledge, creating partnerships and cooperation opportunities between all water related actors in the region.

The 5th edition of AWF was convened by the Arab Water Council during the period 21 – 23 September 2021 in Dubai, EAU under the patronage of the United Arab Emirates' Ministry of Energy & Infrastructure and the sponsorship of the League of Arab States (LAS) and the Ministry of Water Resources and Irrigation of Egypt (MWRI), in collaboration with national, regional and international partners. The forum witnessed this time an unprecedented interactive participation of Arab water ministers, leaders of the water sector in Arab countries and representatives of development partners from regional and international organizations.

The Fifth Arab Water Forum was scheduled to be held by the end of last year (2020), but the conditions of the Corona pandemic (Covid-19) necessitated delaying it for the current year for health safety. Still, it prevented the presence of a number of participants in their-person, but the thanks to the modern technology and good organization of the forum, they virtually participated actively in all the forum events.

Due to the importance of the Arab water forums, the Arab Water Council is keen to document its contents in a report that attests to the opinion of the water community regarding the current challenges and proposed actionable solutions. The report also carries the messages of the Arab region to the international community, particularly during the World Water Forum (WWF), which will be held this time in Dakar, Senegal, during the period 12-26 March 2020. For the sake of preparing on the 5th AWF report, a working group is formed of experts to coordinate and record its proceedings along the course of its events.

Forum Organization

The Fifth Arab Water Forum, in its fifth edition, adopted the slogan ***"Arab Water Security for Peace and Sustainable Development[1]"*** through the three main themes, Arab water security, cooperation in transboundary water, and water for sustainable development. In light of these themes, 24 sessions were organized which consist of: 3 plenary sessions held by the forum organizers around one of the forum's themes, 14 panel sessions organized by development organizations or governmental institutions, 3 scientific sessions for researchers to present their innovations and recent research results, and 4 cross-cutting sessions to address water related topics of interdependence and intertwining nature such as institutional aspects, legal issues and capacity building. Annex (1) gives details of the official program of the forum.

A workshop was organized over the second day of the forum as a side-event. The event was a milestone in a water reuse project implemented by a group of international organizations led by the International Water Management Institute (IWMI). The title of the event was: ***"Regional Dialogue for the Safe Reuse of Treated Wastewater to Face Water Scarcity Challenges in the Middle East and North Africa".***

The last day was concluded by the organization of three special sessions that preceded the closing session. The first was dedicated to the Ninth World Water Forum (9th WWF) to be held in March 2022, in Dakar, Senegal. The 9th WWF is the event during which the messages from the 5th AWF will be transmitted to the world water community. The second session was on "Human Capacity Development for sustainable water resources management" organized by the Arab Water Academy. The third session was devoted to honoring the winners of the Arab Water Council Prize for the year 2020.

A 3-days exhibition was organized simultaneously with the forum, in which a large number of companies working in water technology, water industry and water engineering, displayed their latest products and activities. The 5th AWF was particularly distinguished by allocating time for presentations during the plenary sessions by private sector companies promoting innovative technologies and smart sustainable water management approaches.

Highlights of the speeches in the opening ceremony and the topics presented in the thematic sessions of the 5th AWF are presented in this report as captured by the session rapporteurs. Although there was a unified template used in reporting on the sessions, each rapporteur had his own style in reporting on his session. Attempts has been made to bring all reports as close as possible to the same level of details.

1 www. arabwaterforum.org

The Opening Ceremony

The opening session started in the presence of a large number of Arab water ministers, senior officials from the water, agriculture, energy and environment institutions, representatives of the international organizations, private sector and civil society. The session was also attended by His Excellency Loic Fishon, President of the World Water Council, and His Excellency Mr. Cyrine Mbaye Thiam, Minister of Water and Sanitation of Senegal, the host country of the 9th World Water Forum, whose presence reflects the extent of the world's interest in the content and results of the Arab Water Forum. The opening ceremony had the honor to be addressed with a recorded speech by His Excellency Ahmed Aboul Gheit, the Secretary-General of the League of Arab States, who was attending a United Nations meeting in New York at the same time.

The importance of the inaugural session comes of being an opportunity to listen to the decision-makers, politicians and senior officials and to learn about their vision, ideas, and know the views of their institutions in the issues raised by the forum on water security, cooperation in the field of transboundary water and the role of water in sustainable development. Hence, this section of the report presents highlights of the inaugural opening remarks, though in some details.

Opening Remarks by H E. Dr. Mahmoud Abu Zeid

President of the Arab Water Council

His Excellency Dr. Mahmoud Abu Zeid, President of the Arab Water Council, started the opening session with a speech in which he welcomed the attendees of the 5th Ara Water Forum emphasizing its importance to the Arab Water community and relationship with 9th World Water Forum to be held in the Senegalese capital "Dakar" in March 2022. Both events link the achievement of peace and sustainable development to water security and give particular attention to the desired international regional cooperation, to reach true water security and real sustainable development. This in turn confirms the importance of Arab countries cooperation in order to reach sustainable Arab water security for Arab societies that are suffering from the highest rates of water scarcity.

Dr. Abu Zeid mentioned that water scarcity constitutes the major challenge to sustainable development plans in the region. In turn, it affects food security, economic development, energy security, livelihoods and human health with the fact that the bulk of renewable water resources in the Arab region are transboundary waters that originate from outside their territories. Meanwhile, the region is subject to escalating stresses due to increased demands as a result of population increase, recurrent droughts, climate change, crises of natural and biological disasters, and the epidemic that swept the world. These conditions coincided with high rates of population displacement, forced migrations and political instability. The overall result is high rate of poverty and insecurity and loss of employment opportunities.

For the foregoing, Dr. Abu Zeid called for the necessity of enhancing means of cooperation with regard to water and the development of its resources as a vital and urgent necessity to achieve water security and sustainable development for peoples. Which will not be achieved except through full coordination between regional, national and local policies among all relevant sectors and at the global level among other global plans related to water and national goals and objectives.

Dr. Abu Zeid sent a message regarding the response to the Corona pandemic (COVID-19), saying that the protection of water resources has become one of the most important matters ever. In the midst of this global biological catastrophe, water plays a vital role in fighting the epidemic and even standing in the first defense line against the virus to maintain a decent standard of living for millions of people who are forced to stay in their homes. It is more severe on the poorest groups, who suffer not only from irregular water supplies, but also can hardly meet their basic needs of clean water.

On the role of the Arab Water Council, Dr. Abu Zeid stressed its role to support the global action plan to achieve access to safe water and sanitation for all by 2030 in the Arab region and the world at large. And he called on all Arab governments to consider implementing more rational management measures, water governance and crisis management, to raise the immunity of their countries against damages resulting from climate change, epidemics and economic crises.

Dr. Abu Zeid concluded his speech by calling for optimism, given the comparative advantage of the Arab region having a strong scientific community and great practical experience available in the water sector, whether for drinking water, irrigation, or developing different types of non-conventional water, which is one of the promising technologies that will brilliantly help in dealing with the scarcity crisis.

Opening Remarks by H. E. Eng. Suhail bin Mohammed Al Mazrouei

Minister of Energy and Infrastructure of the United Arab Emirates
(the host country)

His Excellency Eng. Al Mazrouei pointed out that the water-related challenges will become more urgent in the coming years in light of the growing demand for water and the scarcity of resources. Increase in future demand for water necessitate more discussion, exchange of ideas and joint work to build future capabilities capable of facing challenges and overcoming them. In this regard, he emphasized that the UAE will continue its efforts to enhance the scope of regional and international cooperation in the field of water and sanitation to the most needy countries.

He said that as water is an essential pillar of sustainability, it comes at the forefront of the strategic priorities of the UAE. The UAE is leading pioneering efforts to adopt the latest innovations, initiatives and strategies in support of this vital sector to

the national economy and quality of life. Therefore, through its "Water Security Strategy 2036", aims to ensure the sustainability and continuity of access to water in both natural and emergency conditions, and to move this vital sector towards a prosperous future that meets the needs and aspirations of its people.

His Excellency noted that in pursuit of sustainable development, the National Program for Energy and Water Demand Management was approved with the aim of unifying efforts in the field of demand management and rationalization of consumption. In order to ensure the sustainability of energy, water, mining and infrastructure, a special focus is on confronting the challenges by adopting proactive policies and developing appropriate legislation, building strategic partnerships and full cooperation and coordination with the relevant authorities.

His Excellency message to the forum expressed the importance of working towards a coherent, cooperative local and international programs to enhance the integrated resource management approach. Dialogue between the various actors has become a greater necessity than ever before to enhance joint work, innovative solutions and formulate public and private procedures and initiatives in order to ensure better security and sustainability of water.

Opening remarks by H. E. Dr. Mohamed Abdel-Aty

Minister of Water Resources and Irrigation, Egypt

His Excellency Dr. Abdel-Aty started his speech by emphasizing water security as indispensable tool to achieve the UN goals of sustainable development in our countries and to achieve stability and peace for our peoples, through optimal use of every drop of water.

His Excellency added that the many challenges facing our limited water resources at all levels, motivate us to constantly strive towards maximizing the use of our non-conventional water resources. In the meantime, to continue regional cooperation in developing and managing of all local and shared natural resources in line with international laws and norms. Also, to confront climate change in a manner that achieves the sustainable development goals

His Excellency Dr. Abdel-Aty pointed out that the most prominent challenges of the water issue in Egypt is the Ethiopian Renaissance Dam on the Blue Nile, where Ethiopia proceeded to fill the dam unilaterally without reaching an agreement with the downstream countries, in violation of the jointly agreed Declaration of Principles[2] signed between Egypt, Ethiopia and Sudan in March 2015.

2 The 2015 Declaration of Principles stipulates the need to reach an agreement between the three countries on the rules of filling and operating the Renaissance Dam. It obliges Ethiopia not to cause serious harm to the downstream countries, in addition to not violating the relevant principles of international law governing the common use of international rivers.

He mentioned that Egypt has engaged in good faith, over the course of ten years in negotiation rounds seeking to explore all available means to reach a binding legal agreement regulating the process of filling and operating the Grand Renaissance Dam away from any unilateral approach that seeks to impose a reality on the ground and ignores the basic rights of the peoples in the two downstream countries and in the same time secures Ethiopia's development goals from this project.

H.E. Dr. Abdel-Aty informed that Egypt is undertaking an important regional project under the umbrella of the presidential initiative to establish a navigation channel between Lake Victoria and the Mediterranean Sea. The project aims to support economic integration by raising the level of trade and tourism exchange among all the riparian countries in the Nile Basin.

He also said that the national plan for water resources in Egypt is founded on four pillars that is to (i) improve water quality, (ii) rationalize water uses, (iii) develop water resources and (iv) create enabling environment, through programs and executive plans. The plan describes the way Egypt will work towards achieving water security and sustainable development by 2037

Open Remarks by Honorable Mr. Loïc Fauchon

President of the World Water Council (WWC)

Mr. Faucon emphasized in his speech that the Arab countries have participated in the adventure of the World Water Council from the very beginning. It was Egypt, together with the World Bank and UNESCO, which initiated the creation of WWC. Now, WWC comprise. 400 member organizations from 70 countries.

Mr. Faucon told that water has become one of the main concerns for the future of our planet and this is why the subject of water security is now at the center of our concerns and at the center of all our work. The Arab countries are facing a shortage of resources and frequent water stress which is slowing down their development and creating unbearable tensions. He explained that the way to guarantee water security for promoting sustainable peace and equitable development is through shared understanding of the causes of the tensions over water resources and their use.

Noting that a large uncontrolled population growth in many Arab countries gave way, as in the rest of the world, gave way to a disorderly, uncontrolled urbanization. The urban concentration is highly water consuming. In addition, there is a rise in the standard of living, and the increasing demand for manufactured products and public services call for ever-increasing water consumption. A subsequent result is creation of intense land water pollution with many health and environmental serious implications. He also noted that the future effects of climate evolution will disrupt the desire to achieve water security.

In attempt to balance between supply and demand, he said that the World including the Arab countries recognized the need to "produce" more water and consume less. For producing more water, today, around 20 000 desalination treatment plants are functioning all over the world, 30 % of which are in the Arabic countries, both to generate energy and water for domestic and industrial uses. But he warned of their major impact represented by saline and brine discharges that create problems for biodiversity when they deposit on land or on shallow coasts. Another opportunity exists in wastewater reuse that offers more interesting prospects for the future. Modern wastewater treatment plants ultimately discharge water that is suitable for human consumption and, at least, for agricultural production.

Mr. Faucon warned about the need for water for nature and not just for mankind because nature is the best way to protect water. It preserves and filters water, thus maintains the quality and quantity of water. So, we must understand the need to share water between human beings and nature.

He also called for necessary re-thinking the concept of dams and reservoirs which sometimes move populations and the human needs and 'assault' nature as well. He advocates the need to evolve from the concept of dams to the concept of aquatic biodiversity reserves, which are above all a means to protect biodiversity.

In few words about transboundary basins, Mr. Faucon, mentioned number of successful examples of basin governance through treaties and operated dedicated organizations where dialogue and sharing are the rule. On the other hand, he mentioned the case of the Nile River, where the construction of the Renaissance Dam in Ethiopia had triggered major tensions with downstream States, such as Sudan and especially Egypt. He confirmed that dialogue, a full but discrete dialogue and nothing else than technical dialogue, is the only recommendation issued by our Council to deal with this type of situation".

Mr. Faucon referred also to the right to water which so easily proclaimed but so difficult to enforce and concretely implement. He described this issue as a sensitive subject, an ethical subject but also an economic and social and therefore political subject.

His important message was: "It is the role of all of us - the Arab Water Council, the World Water Council and many others - to bring together all those who think about the future of water and to promote concrete solutions and responses to put an end to the suffering of water."

Opening Remarks by H. E. Mr. Serigne Mbaye Thiam

Minister of Water and Sanitation of Senegal

H.E. Minister Thiam started his speech by confirming Senegal's deep commitment to its exemplary cooperation with the Arab States and the Islamic Ummah (nation), in general. He added that Senegal attaches strategic importance to the issue of water at the international level and adheres to the Water Vision of the Organization of the Islamic Conference: "Working together for a water secure future ", which lays the foundations for the achievement of the SDGs. Ensuring water for people, productivity and the environment is a necessary condition for sustainable growth, the fight against hunger and poverty and the achievement of the 2030 Agenda.

H.E. Mr. Thiam defined water as a factor of economic stability, peace and security for human societies. It is essential for health and indispensable for the most essential activities of society: agriculture, energy, transport, etc. He further explained that dwindling water supplies very often mean more human suffering and an increased risk of instability, conflict and migration. He added that climate change is now at the heart of debates and most states in the world are facing security and strategic challenges related to the scarcity of available water resources.

He emphasized the importance of promoting cooperation in the field of transboundary waters as a key to regional peace and stability. In this respect, Senegal has been particularly involved in hydro-diplomacy, notably through the Organization for the Development of the Senegal River (OMVS[3]) and the Organization for the Development of the Gambia River (OMVG[4]), which are responsible for the management of water resources shared between the riparian countries.

H.E. Mr. Thiam recognized the 5th Arab Water Forum as directly in line with that of the 9th Forum "Water Security for Peace and Development" that Senegal and the World Water Council are co-organizing from 21 to 26 March 2022, in Dakar. Senegal and the World Water Council, by organizing the 9th Forum, intend to consolidate the political dimension of water, particularly its contribution in peace building, development and socio-economic resilience in the context of the post-Covid-19 recovery.

H.E. affirmed that the conclusions that will emerge from the Arab Water Forum, will make it possible to draw and share the lessons, innovations, experiences and many successes in the field of sustainable water management, and above all to enrich the content of the 9th World Water Forum, "Dakar 2022".

3 The Organisation pour la mise en valeur du fleuve Sénégal (OMVS; in English Senegal River Basin Development Authority) is an organisation grouping Guinea, Mali, Mauritania and Senegal for the purpose of jointly managing the Senegal River and its drainage basin.

4 The Organization pour la mise en valeur du fleuve Gambie (OMVG; in English Gambia River Development Organization) is an intergovernmental organization that was founded by the West African states of Gambia and Senegal with the aim of planning the development of the Gambia River as a natural resource.

Opening Remarks by H.E. Ahmed Aboul Gheit

Secretary General of the League of Arab State (LAS)

In his televised speech H. E. Aboul-Gheit reiterated the position of the Arab League in support of the Arab countries in obtaining their rights from the shared waters in accordance with fair and binding agreements and legal rules that take into account the Arab rights to life and development. He mentioned that the aggravation of the Arab water deficit crisis constitutes a real concern for Arab national security, as water shortage causes deterioration in food, high numbers of displacement and slowing down the development path.

H.E. Abul-Ghait said that the emerging crisis of the Corona virus has contributed to raising awareness of environmental problems, including water. That is because the policies of green recovery and sustainable development after the pandemic depend largely on reconsidering the methods of managing in innovative and sustainable manner our natural resources

He stressed that inter-sectoral actions should constitute the dominant model in the future for policy implementation. In this respect, LAS established a joint ministerial council on water and agriculture, and in this regard, a high-level joint ministerial committee has been formed to implement the outcomes of the 2019 Cairo Declaration.

DAY 1

Tuesday, 21st September

First Day Report **21 September 2021**

Theme of the day: Arab Water Security
Theme Rapporteur: Prof. Shaden Abdel-Gawad

Overview of the first say

The Forum first day focused mainly on theme 1 of the forum: "Arab Water Security". It included: one Plenary Session, 5 Panel Sessions on Water Reuse, Desalination, Climate and Small Scale Irrigation schemes and a Scientific Session. All centered on the day theme. Following is brief reports of each session, the main conclusions and recommendations as well as the messages came out of the day sessions.

Plenary Session PL1

Title: Arab Water Security

المجلس العربي للمياه
Arab Water Council

UNITED ARAB EMIRATES
MINISTRY OF ENERGY & INFRASTRUCTURE

Conveners: Arab Water Council (AWC) and Ministry of Energy & Infrastructure, UAE

Session Officers

Chairperson H.E. Mariam bint Mohammed Almheiri, Minister of State for Food and Water Security, UAE.
Moderator: H.E. Dr. Hussein El-Atfy, Secretary-General, AWC
Rapporteur: Prof. Shaden Abdel-Gawad, Former President of the National Water Research Center

Session Scope and Objectives

The objective of this session is to highlight the importance of water security for the Arab countries which lie in arid and hyper-arid regions, and where over 60% of its renewable surface water resources originate from outside its boundaries. The Water-Energy-Food Nexus approach and its relation to Climate Security to deal with these challenges is the main focus to be addressed.

Speakers

Name	Position / Organization & Country
H.E. Mariam bint Mohammed Almheiri	Minister of State for Food and Water Security, UAE
H.E. Tariq Abdel Salam Abu Flika	Minister of Water Resources, Libya
H.E. Mohammad bin Jarsh Al Falasi	Undersecretary of Abu Dhabi Department of Energy (DoE)
Dr. Ragab Abdel Azim	Senior Undersecretary, Ministry of Water Resources and Irrigation, Egypt
Prof. Walid Abderrahman	Vice President of the Arab Water Council (AWC) (Virtual)

Topics Presented

As introduction to the session the session moderator emphasized the importance of the main theme of the Forum "***Arab Water Security for Peace and Sustainable Development,"*** where this event comes at a time where increasing and accelerating political, social and economic developments are ravaging the Arab region. For setting the stage he mentioned the following:

- water, food and energy security are in the center of the Arab National Security.
- Despite the great efforts exerted by Arab Governments to face the water-related challenges, yet the Water and Food Sectors still constitute a nuisance in the Arab region.
- Challenges include: increasing water scarcity, a widening food gap, fast and unplanned urbanization, climate change and related natural disasters, increasing water demands, violation of the Arab Water rights in transboundary water, and the spread of terrorism besides the Corona virus pandemic.
- Innovative technologies and out-of-the-box solutions are the only way to face such challenges, and what are the tools and mechanisms needed for achieving the required goals.
- the mainstreaming of the water-energy-food nexus and its interrelations with climate change and ecosystems into national policies, and the efforts for disaster risk reduction, to achieve the aspired Sustainable Development Goals and the global agenda 2030.

The First Speaker, H.E. Mariam bint Mohammed Almheiri, main highlights were:

A presentation of the National efforts exerted by UAE towards achieving water and food security, with special focus on the importance of state-of-the-art technologies in managing the shared water resources. Details included:

- The right to safe drinking water and sanitation is a basic human right that should be ensured, despite the challenges faced.
- UAE has adopted a holistic approach for promoting water and food security based on the close cooperation and coordination of all national and international development partners.
- UAE has launched two strategies: the National Strategy for Food Security 2051, and the Water Security Strategy 2036 initiated by the UAE Ministry of Energy and Infrastructure.
- The UAE is always keen to transfer challenges into opportunities, which is evident in gradually transferring the desert regions into prospective and sustainable projects (fish farms, greenhouses, etc.) towards a brighter future.
- The importance of joining efforts to maximize the benefit obtained from our water resources in the Arab region towards achieving sustainable development.

The Second Speaker, H.E. Tariq Abdel Salam Abu Flika. The main Highlights of his presentation on the water and food security endeavors in Libya under the unprecedented challenges of water scarcity, climate change, and incessant population increase, leading to decline in the economic were the following:

- Transboundary water conflicts and efforts should be made for changing such conflicts into cooperation and win-win solutions.
- The serious challenge of over-exploitation of groundwater and depletion of the groundwater aquifers.
- The effect of wars on the poor performance of the water service facilities.
- The role of water desalination as a strategic option for surmounting the water-related challenges.
- The dependence of Libya to a great extent at present on the "Man-Made River Project."
- Importance of a holistic vision, strategic partnerships and collaboration between countries and relevant entities to conserve natural resources and achieve sustainable development in the Arab region.

The third speaker was H.E. Mohammad bin Jarsh Al Falasi. The Main Highlights of his speech was focused on the importance of the water desalination industry as the cornerstone of the water sector in UAE, and presentation of the 2050 integrated water model in Abu Dhabi. Details included:

- The DoE in Abu Dhabi is responsible for developing the water sector by setting policies and regulations, applying appropriate mechanisms and work plans, and providing all necessary means and tools for improving the water services, besides introducing latest technologies in the water desalination stations.
- Highlights on Abu Dhabi experience in water desalination and conveyance, which represents about 30% of the water resources in the country.
- The "Water Reuse strategy" in Abu Dhabi in 2018.
- Treated wastewater (to the tertiary level) represents about 10% of the water resources in Abu Dhabi (referring to the opportunity for exchange of experience in this field with the newly established Bahr El-Baqar treatment plant in Egyptian, the largest in the world).
- Launching the 2019 Water Demand Management Strategy with its nine programs, and the comprehensive 2030 Integrated Energy Sector Strategy and mechanisms of lowering consumption cost.
- Focus on the huge man-made water storage project in Abu Dhabi with large storage capacity.

The fourth speaker was Dr. Ragab Abdel Azim. His presentation was focused on the four main pillars of the National Water Resources Plan to face Egypt's water challenges, which are:

1. Improving Water Quality by reducing domestic, industrial, agricultural & aquaculture pollution loads, and improving drainage water quality.
2. Rationalizing water use, as far as agricultural is concerned by adoption of a "National Program for Canal Rehabilitation" and Improvement of the On-Farm Irrigation Systems", in addition to encouraging "Farmer-to-Farmer Dialogue".
3. Developing water resources including use of non-conventional resources, as well as cooperation with the Nile Basin countries regarding the shared water use.
4. Creating an enabling environment for the successful application of the strategy including institutional reform, rules and legislations, awareness campaigns, capacity building and human resources development, use of state-of-the-art technologies,

- Actions to face the effects of Climate Change precautions, including studies of the hotspots for flash flood protection, sea level rise and rainwater harvesting.
- Importance of awareness-raising about the water challenges for all levels of the society, including parliamentarians, to guarantee proper decisions and priority actions.
- Role of specialized media and awareness campaigns, with special focus on women and youth, and children's at schools.

The fifth speaker was Prof. Walid Abderrahman, His "virtual" presentation focused on the "Arab Rights in Water shared with other Non-Arab Countries, Water in Occupied Territories and Present Status and Challenges to Achieve Water Security." The highlts of his speech were:

- Definition of Arab Water Security and the background of water scarcity in the Arab region.
- Renewable Water in the Arab region and the importance of shared rivers in light of the decline of the water discharges in the shared rivers due to construction of dams in the upstream countries.
- Impact of the decreasing quantities of shared river water on the per capita share of water, as well as on the water and food security and energy generation in the Arab countries.
- Suggested solutions to enhance protection of the Arab rights in the shared international rivers include:

  First: Establishment of a Joint Cooperation Commission for each group of countries sharing the same river basin to coordinate the water-energy-food-related aspects in a comprehensive and integrated nexus approach, in addition to the enhancing the social and economic cooperation between the basin communities.

Second: Establishment of a special Entity for Arab Water Diplomacy in negotiating Arab water rights in shared rivers, a task to be taken jointly by AWC & LAS, under the umbrella of the Arab Water Ministerial Council.

New Ideas and Innovations

- Extracting water from air and fog is one of the upcoming trends.
- Establishing fish farms in the desert areas, and greenhouses for water conservation.
- Smart Irrigation Applications available to farmers, and all stakeholders on mobile phones using advanced remote sensing and GIS technologies for detecting the exact quantities of water demand, hence ensuring proper water use decisions.

Main Conclusions and Recommendations

1. Water is a human right for All, yet water security actions (policies, standards and initiatives) should not be the sole responsibility of Governments but the responsibility of all to think of how to conserve water and respect it.
2. Arab water security and food security are inter-related as two faces of the same coin, and are closely linked to the energy sector. A Water-Food-Energy nexus approach, as related to climate change and ecosystems, is highly encouraged to be adopted by national policies, to achieve sustainable development in the Arab region.
3. An optimistic perspective for the future of the Arab Region is needed, despite the nowadays various prevailing challenges, there are lots of opportunities represented by the relative advantage of each of the Arab countries and the expertise within the region, the available human and natural resources, the existing basic infrastructure, and the needed financial resources, among others.
4. Innovative technologies and out-of-the-box solutions are idespinsible to face the challenges, while adopting appropriate policies and encouraging regional and international partnerships.
5. Countries should work towards transferring challenges into opportunities regarding the prevailing water scarcity crisis at the Arab scale.
6. The role of water desalination as non-conventional water resource is an important strategic option for surmounting the challenge of water scarcity.
7. Awareness-raising for all levels of the society, including parliamentarians, to guarantee proper decisions and priority actions is imperative.
8. The role of specialized media and awareness campaigns should be emphasized, with special focus on the role of women and youth.
9. The Arab region is reaching a critical turn-point regarding shared water resources and a strong “International Alliance for Downstream Countries” is needed to promote the protection and defense of the Arab countries water rights.
10. Establishment of a “Joint Cooperation Commission” for each group of countries

sharing the same river basin to coordinate the water-energy-food-related aspects in a comprehensive and integrated nexus approach, in addition to social, economic and technical cooperation between the basin communities, and initiating joint projects promoting shared responsibilities to ensure the "no-harm" principle and maximize shared benefits towards sustainable development for all.

11. It is highly recommended that AWC, together with LAS and development partners, to work towards establishing a special "Entity for Shared Water Diplomacy" to assist in solving the conflicts of shared river basins and improve transboundary water management with a long-term holistic vision towards the future of shared water.
12. The Arab Water Council, with its accumulated experience and facilities, keeps playing the role of the "Regional Coordinator" in the Water Sector on the Arab scale, offering full technical and professional support to provide development and capacity building opportunities through its Arab Water Academy for a brighter future of the Arab region.

Panel Session P1-PS1

Session Title: Water Security in the Mediterranean Region: Sustainable Water Reuse Strategies in Agriculture – Case Studies and Regional Perspectives

Conveners: IWMI, CHEAM Bari, and NRD-UNISS

Session Officers

Chairperson: Chairperson is Mr Alberto Carletti (Coordinator of MENAWARA project)
Moderatour: Dr. Roula Khadra , (CHEAM-Bari)
Rapporteur: Ms. Marie Helen (ReWater-Mena, IWMI) and Dr. Amel Azab AWC

This session aims at fostering shared knowledge and experiences, sustainable initiatives, and governance approaches to encourage the reuse on non-conventional water (NCW) in agriculture.

Speakers:

Name	Organization	Title of Presentation
Dr. Nesreen Laham	IWMI	ReWater Project

Panelists:

Name	Organization
Amgad El Mahdi	IWMI
Hammou Laamrani	LAS
Nizar Hadad	NARC
Isabel Martin	CENTA
Adel Yasin	PWA
Abdel Magid Bettaieb	ONAS

Topics Presented:

The session started by a presentation from a private sector presenter from Bauer, Mr. Denis Maxwel who highlighted the industrial and domestic wastewater challenges in the Arab states and different innovative ideas developed by Bauer on using constructed wetlands and then presented examples of nature based solutions for wastewater treatment such as constructed wetlands and Reedbox methodologies.
After the opening remarks by the chair Mr. Carletti and the Director of NRD-UNISS, Mr. Quirico Migheli, a video on the MENAWARA Project was displayed with interviews of different farmers from the project member countries (Spain , Tunisia, Palestine and Jordan)
A detailed presentation from Dr. Nesreen Laham, officer, IWMI, on the ReWater Project was given to highlight the project objectives, partners and case studies from different countries, achievements and challenges. The project will end in September 2022 and the project recommends for collaboration from other partners to join and continue further activities.
After the Re-Water introduction, a panel discussion started to share experiences from the panelists from Different countries (Jordan, Tunisia, Palestine, EU) and to give their opinions on key raised issues that are highlighted below.

Main Conclusions and Recommendations:

- Reuse of wastewater is a strategic choice to water security in countries with scarce water resources. In Jordan water reuse is considered the main renewable source of water. Regional policies should recognize the reused water as part of the water rbalance to change the perception of risk.
- National strategies and regulations for wastewater reuse must be developed through collaboration between different organizations and partners
- Setting flexible strategies for wastewater reuse to take into consideration any sudden outbreaks
- Technical and financial aspects limit the reuse of wastewater in most of the countries
- Wastewater collection and treatment is happening and advancing in Arab Region but there is a need to advance in the reuse as well, but technical and

financial aspects limit the reuse of waste water in most of the countries

- There is a need to invest in infrastructure and a need to develop a business case to promote the wastewater reuse for different levels of users; governments, public, farmers,..etc.
- There is a need in the region to address Demand side for water rather than Supply side taking the positive example of UAE.
- The reused wastewater quality, safe reuse instructions, standards and guidelines are needed to change the perception of citizens. LAS has an important role to shape the regional standards of Water reuse including capacity building at different levels.
- On the regional level there is a need to bring countries together through partnerships and regional projects (such as ReWater and Menawara) on Wastewater reuse. Such imitative can be supported by LAS.

Panel Session P1-PS2

Session Title: Water Desalination as a Strategic Option for Sustainable Arab Water Security

هـيـئـة الـبـيـئـة - أبـوظـبـي
Environment Agency - ABU DHABI

Convener: Environment Agency Abu-Dhabi

Session Officers
Moderator: Dr. Mahamed Dawoud, EAD
Rapporteur: Mr. Gamal Shedid, Deparrment of Energy (UAE), and Dr. Tarek El-Samman (AWC)

The objective of this panel session is to discuss the future of desalination industry in the Arab Region.

Speakers:

Name	Organization
Prof. Hassan Arafat	Director of the Center of Membranes and Advanced Water Technology (CMAT) and Professor of Chemical Engineering, UAE
Prof. Hossam Shawky	Deputy Chairman of Desert Research Center and Director of Egyptian Desalination Research Center of Excellence
Prof. Ahmad Moawad	Holding Company for Water and Wastewater (HCWW)
Eng. Mohammad El Ramahi	Director, Asset management and Technical Services, (MASDAR), UAE

Topics Presented:

- Gulf water salinity is too high casing challenge for desalination.
- Need for solutions to lower the cost of electric energy which constitutes 50-70% of desalination cost.
- Desalination opportunities in the Arab region exceed the challenges.
- Need to protect the environment from the residuals and brine left from desalination.
- Desalinated water could be used in agriculture provided the same water is reused in adjacent fish farms.

New ideas and innovations:

- Nationalizing the production of the desalination technology to decrease the overall cost.
- Use of renewable energy for desalination as necessary option to ensure sustainability.
- Construction of solar energy plants in desert areas to increase their efficiency in supplying coastal desalination plants
- Use variable tariffs through the day for water and electricity to reduce consumption during the peak periods of the day.

Main Conclusions and Recommendations:

- Desalination technology is finding new outlets in supplying freshwater for future development in domestic, agricultural, industrial and economic sectors
- Desalinated water production in the ME is expected to grow almost 14-fold by 2040
- Arab countries should work on solutions to reduce the cost of energy for desalination and consider atomic energy as a possible cheaper alternative.
- Governments are invited to make available sufficient land areas at reasonable cost to attract investments in desalination.
- Building capacities and skills of operators and manpower specialized in desalination by establishing technical schools or training centers according to the needs of the desalination market.
- Development of the membranes industry
- Insuring the and the economic sustainability measures of the desalination plants.
- localize the production of desalination technology by the Arab countries and encourage the private sector to invest in this industry.

Panel Session P1-PS5

Session Title: Water and Sanitation Sector: Overview & Strategic Future Vision.

جمهورية مصر العربية
وزارة الإسكان والمرافق والمجتمعات العمرانية

Convener: MHUUC

Session Officers
Moderator: Dr. Rifaat Abdel Wahaab
Rapporteur: Maha Khallaf

(The ministry was participating to the forum by a high level delegation headed by H.E. the Minister Dr. Asem Elgazar and Vice-Minister Dr. Sayed Ismael).

The objective of this session is to discuss the current status of water and sanitation sector in Egypt and the reform steps taken as well as Egypt's recent developments in saline water desalination, and share Egypt's experience in this sector.

Speakers:

Name	Organization	Title of Presentation
Dr Sayed Ismail	MHUUC	Overview of Egypt's water sector
Prof Dr Abdel Kawi Khalifa	Ex- Min of W& WW Utilities Egypt	Overview of water sector reform in Egypt
Eng. Mamduh Raslan	HCWW Chairman	HCWW and plans in water sector egypt
General Ehab Khedr	NOPWASD Chairman	Hayat Karima Presidential initiative - Egypt
Generl Assen Shokr	HCWW Vice-Chair-man	Overview Desalination plans and strate-gies – Egypt

Topics Presented:

- The session presented an overview of the water, wastewater, and desalination Projects in Egypt (in terms of rehabilitation and/ or constructing new projects)
- There is a focus on the wastewater projects, reuse of domestic and agriculture wastewater
- Special emphasis on the expansion of desalination particularly in all cities along the long sea shores of Egypt.
- The focus is on expanding and diversifying the water resources and optimizing the existing ones.
- Emphasis is on the reduction of physical and commercial losses.

- There is also a focus on the presidential initiative of Hayat Karima (dignified life) implemented at the national level in Egypt covering different areas of water, wastewater, education, health, ….) in the rural areas.

Main Conclusions and Recommendations:

- The Egyptian government is making great efforts in the field of saving and rationalizing water consumption, and developing renewable sources to obtain clean water, by pumping large investments in the field of water security.
- The Egyptian state is implementing an ambitious plan to desalinate sea water, especially in new cities and coastal areas, using modern technologies to construct desalination plants.
- Huge investments are made to build large scale drainage water treatment plants to make additional water to irrigate new land in Sinai and North-West coast.
- The Ministry of Housing, Utilities and New Urban Communities is in the process of establishing and upgrading of several dual and triple sewage treatment plants, to safely reuse water in irrigating green spaces and plants in new cities, and providing clean water.
- Infrastructure upgrade is accompanied with effective reform of the sector to improve service delivery to the satisfaction of the clients.

Panel Session P1-PS3

Session Title: Climate and Water Security in the Arab Region: From Words to Action

Conveners: AWC, LAS and SDG-Climate Facility, Sweden Sverige, UNDP, UNEP/FI, WFP, UN/Habitat, UNDRR

Session Officers

Chairperson: Pro. Dr. Mahmoud Abu Zeid
Moderator: Dr. Amel Azab.
Rapporteurs: Dr. Amel Azab, Dr. Tina Jaskolski, Ms. Maya Atie.

The objective of this session is to explore the interplay of compound risk due to climate change and discuss how such risk may lead to regional climate and water security concerns.

Speakers:

Name	Organization	Title of Presentation
Dr. Nada Al-Agizy	LAS	Climate Security and the Sustainable Development Goals
Dr. Ajit Govind	ICARDA	Data for Climate and Water Security in the Arab Region
Prof. Wadid Erian	LAS	Mapping the Impact of Climate Change on Water Security in the Region: The Arab Geographical Information Room (AGIR)
Prof. Khaled Abu-Zeid	AWC	The Transboundary Climate-Water Security Nexus
Prof. Walid Abderrahman	AWC	The Use of Regional Climate Models Instead of Global Models for Accurate Assessments of Climate Changes to Achieve Climate Security in the Arab Region: Saudi Arabia A Case Study
Dr. Maya Atie	AWC	Introducing the Regional Climate Security Network
Dr. Theresa Wong	FAO RNE	Migration as adaptation strategy in the NENA region
Dr. Jean D'cunba	AWC/UN	Migration-Induced Migration: A Gender Equality and Women's Empowerment Perspective from Jordan and Sudan
Dr. Martina Jaskolski	UNDP/AWC	The Climate, Water, Gender, and Migration Nexus
Ms. Sujala Pant	UNDP	Scaling-Up Water Innovation for Climate Security in Northern Jordan

Topics Presented:

- Scaling up local partnerships and financing through diverse networks at regional and country levels. Many agreements were established for collaborations between countries (Jordan, Iraq, Tunisia, Egypt, Yemen and Palestine) to extend the local experiences to regional level as well as to support the execution of efforts on avoiding and fast recovering from climate related crisis
- Two reports have been elaborated highlighting the water challenges in the Arab region. In one report the Arab region is discussing the effect of conflicts on efforts of establishing a sustainable development and implementing the agenda 2030.
- Setting strategies to achieve sustainable developments in the light of climate change related problems, especially since the Arab region is the most affected. For tis purpose many scenarios were simulated to assess the effect of the climate change on the region in which:
  i. Simulating a 100 years' series of the including the effects of the Renaissance Dam on the Nile downstream part (Sudan and Egypt). A global climate model was used for the simulation.
  ii. A second study was elaborated with the use of a regional climate model for assessing the climate changes to achieve climate security in Saudi Arabia.
- Supporting national and regional stakeholders to consider climate change in the different strategies.
- Introducing the Regional Climate Security Network aiming on establishing a

regional platform that enables constitutions across the Arab region to integrate the climate security into the policy making and strategic panels.

- Explore the effect of climate changes on the gender experience in agriculture. Studies of the climate migration and gender nexus in Sudan and Jordan were elaborated.
- Facilitate scaling up of climate finance for innovative solutions to operationalize the nexus approach was discussed.
- Disagreement was raised about using the global climate model for assessing the climate changes at regional levels that will not provide accurate results.

Main Conclusions and Recommendations:

- Climate change is making the world more complex thus, there is a need to shape a strong regional approach and partnership. The Arab region countries as affected by climate changes and as producers of different agricultural products that are considered as virtual water, should collaboration with European scientists, agriculture sector decision makers etc. has an important role in strategies and pattern to be followed by
- Problems of data availability with high resolution and the need for establishing a good data base at local and regional levels. There is a need of better regional data on climate security as well as better understanding of regional climate trends
- Strengthen regional partnership on climate security action including transboundary resource sharing agreements and cooperation is means to peace and regional stability. Transparency and exchanging of data across the boundaries in order to up-scale the studies from local to regional scale. Technology transfer and exchange for modern measurement tools are encouraged.
- Assessing the effect of the climate change on water resources and transboundary conflicts. Natural based solutions for climate adaptation are highly recommended.
- Undertake research on localized nuances of climate, migration and gender nexus to inform targeted policies that address the distinct priorities of men and women.
- It is necessary to enhance understanding of climate change in localized contexts, it's interrelationship with ecosystems, socio-economic factors, political factors and gender inequality

Panel Session P1-PS4

Session Title: Investing in Small-Scale Irrigation Schemes Versus Large-Scale Irrigation Projects

Conveners: IFAD and IWMI.

Session Officers
Moderator: Hammou Elamrany
Rapporteur: Prof. Aly El-Bahrawy

The session demonstrates IFAD and IWMI experience in supporting investments in irrigation schemes. The session aims at presenting a comparison among investments including case studies in water management, water saving technologies and irrigation infrastructure at the level of smallholder farmers and in large facilities.

Speakers:

Name	Organization
Mr. Tarek Kotb	IFAD
Mr. Amgad El Maahdi	IWMI
Ms. Charafat Afailal	Ministry of Water, Morocco
Ms. Akics Bahri	Tunisia
Mr. Hammou Laamrani	LAS
Ms. Fatima Magzoub	Sudan

Topics Presented:

Dr. Tarek Kotb reviewed IFADs' experience in improving small irrigation for poor farmers, large scale is not sustainable.

- Small holder labor intensive examples in Africa and Asia.
- OFIDO project in Egypt an example of groundwater pressurized pipes, reduction in irrigation labor.
- Amhara drip irrigation solar power irrigation. Sustainability requires a pre financing tool.

H.E. Sharafat former Minister of irrigation
King Hassan supported policy to develop irrigation agriculture

- one million acers irrigation area by year 2000, 140 large dams, develop small scale irrigation,
- Green Morocco solidarity agriculture farmers in remote areas stopped moving to large cities

- Mechanisms to help small farmers are developed
- Partnership with farmers to build small dams and contract to take care of dam maintenance.
- farmers learned how to modernize their irrigation system
- government provided aquifer contract and permission to extract and equipment

Dr. Fatima Magzoub, Sudan

- young people immigrated from fallow lands since cost of irrigation is high
- we need modern irrigation and solar energy from government
- project provided great benefit from modern irrigation and organized farm working

H.E. Akisa Bahry, fromer Minister of irrigation, Tunisia

- evidence base data are needed and private sector is part of the dialogue
- quality of data to be processed and analyzed is important
- agreed policy should be implemented
- small scale irrigation economic, social and environmental elements are to be integrated in research institutions
- a dialogue and sharing information and talking the same language are important elements of success
- results need to be translated into policy
- work together on a national level is important
- when being a Minister we need to establish dialogue between private sector and user
- capacity building makes economic aspect important
- mechanization of agriculture supply chain are important issue
- no women no agriculture, but women are invisible

Dr. Amgad Elmahdi, IWMI

Innovation in small scale agriculture, different angle and examples

- how to promote and solve a problem and scale it up
- More investment is needed,
- does it work with small holder farmer? one project local solution as example.
- Mali and Ethiopia and have access to internet, simple technology and farmer association to adapt technology, sensor to tell them when to irrigate, 20 percent of water was saved as a result, low cost technology, after project ends sustainability is an issue.
- In Jordan, water market for water saving technology supplier and retailer work with them,
- talk to farmers and define their needs how to make data available to farmer in Egypt.

- farmers don't need to understand the calculations only how to use the app
- support innovation by interacting with farmers, create an innovation hub
- we require to make a shift and invest in the agriculture sector
- increased private investment is needed

Main Conclusions and Recommendations:

- Since most of the world's food is produced by small scale farmers, the feasibility of investing at this level has been proven as demonstrated by the number of initiatives as well as their effectiveness in improving the incomes of rural poor.

Scientific Session P1-SS1

Session Title: Arab Water Security

Convener: Arab Water Council

Session Officers
Chairperson: Dr. Waleed Zubari
Rapporteur: Dr. Ahmed Ali Ayoub

Typically, the scientific session includes presentations by researchers reporting findings and results of their work related to the forum themes. Contributions to this session are shown in the following table.

Presentation Title	Authors
Desalination Technology and Water Prices: Is Water Public or Private Goods?	Albert S. Kim,
Innovative Model for Development of Sant Katrin Area Based on Water, Energy and Food Nexus	Kamel Mostafa, Reda Rizk and M. El-Sherbini (AOAD)
Tracing tradeoffs at the water-energy nexus for watershed solutions	Caroline King-Okumu, Abdrabbo A. A. Shehata Aboukheira, Hadi Jaafar, Mongi Benzaied, Ahmed Hannachi
Modelling soil moisture and solute transport under water reuse irrigation and climate change scenarios in the Nile Delta Region	Dahlia Sabri, Bernhard Tischbein, Reinhard Hinkelmann
Evaluating the Long term Impacts of Wastewater Reuse in Jordan	Almoayied Assayed, Ayat Hazaymeh, Husameddine Al-HajAli and Nanci Zeq

Topics Presented:

The session aimed to point out the different aspects that should be taken into consideration when dealing with water security, from humanitarian and social aspects to technical and economic ones and to illustrate regional case studies/ successes stories from the Arab region in order to pave the way for possible cooperation and sharing knowledge paths.

- To ensure sustainable usage of resources, Water-Energy-Food Nexus had to be always taken into consideration in planning and executing local 'socially appropriate' solution. A good example of that is the successes story shared by AOAD in Saint Catherine region where more than 240 mountain lakes were developed for crisis prevention and the water was used for recreational purposes along with irrigation using energy generated from solar panels.
- Within the Water-Energy-Food Nexus, climate change had to be always embedded in the planning process in local solutions in order to ensure their sustainability and understand their limitations.
- To study the impacts of reclaimed water reuse in agriculture, historical data availability is a major challenge that had to be faced.
- For evaluating the long term impacts of wastewater reuse in agriculture in middle Jordan valley, soil samples to be analyzed from different depths during various seasons and from three plots.

New ideas innovations:

- Water harvesting through mountain lakes help to protect the Bedouin communities from extreme weather events (storms) and generate economic benefits from agriculture and tourism. The harvested water was also used for irrigating green houses and recharging shallow aquifers.
- Hydrological modeling of soil water transport solute like HYDRUS could be used to simulate the management of irrigation scheduling, in some cases more frequent irrigation could significantly reduce the expected salinity impacts from the use of reclaimed water.
- To forecast the missing data gaps in existing data sets, machine learning neural networks could be used to forecast (with certain accuracy) the expected impacts from using reclaimed water.

Main Conclusions and Recommendations:

- Desalination technology using hollow fiber modules are preferred in industrial applications of membrane distillation due to their high packing ratio. Theoretical methods and numerical algorithms can contribute to the improved scalability of CFD simulations from lab-scale modules to pilot-scale systems.
- In the light of the expected global population increase, which is pressing on the limited available water resources, water valuing has to include the value of water as a human right along with cost recovery plans. This tradeoff had to always be considered in water pricing strategies.
- To ensure sustainable usage of resources, Water-Energy-Food Nexus had to be always taken into consideration in planning and executing socially appropriate local-solution. A good example of that is the successes story shared by AOAD.
- Within the Water-Energy-Food Nexus, climate change had to be always embedded in the planning process in local solutions in order to ensure the solution's sustainability and its limitation.

- To study the impacts of reclaimed water reuse in agriculture, historical data availability is a major challenge that had to be faced.
- Monitoring long term impacts of waste water reuse on the soil is important to ensure the agricultural production sustainability.
- Hydrological modeling of soil-water transport solutes is useful to simulate the management of irrigation scheduling, and reduce the salinity impacts from the use of reclaimed water.
- Machine learning neural networks could be used forecast data gaps in existing data sets. It has been successfully used in a study on the expected impacts from using the reclaimed water from As-Samra treatment plant in Jordan

DAY 2

Wednesday, 22nd September

Second Day Report 22 September 2021

Theme of the Day: Transboundary Water Cooperation
Theme Rapporteur: Dr. Mohamed A. Dawoud

An Overview of Day 2

The forum second day included one plenary session and 9 thematic parallel sessions (5 Panel sessions, 3 cross-cutting sessions and one scientific sessions). The main focus of day 2 sessions was focused on theme 2 of the forum "Transboundary Water Cooperation". However, 4 of the parallel thematic sessions were addressing topics of nature related mostly to theme 1 "Arab Water Security" or theme 2 "Water for Sustainable development". In addition, a day-long special event was organized by IWMI /CGIAR, AWC, FAO RNE & LAS on "the First Science-Policy Dialogue on ReWater MENA Project: More and Safer Water Reuse in the MENA Region.

The following is a listing of the reports of the day thematic sessions in the order of their organization:

Plenary Session PL2

Session Title: Transboundary Water Cooperation

Conveners: AWC, LAS and CEDARE

Session Officers

Chair: H.E. Dr. Mahmoud Abu Zied, President of AWC
Moderator: Dr. Hussein Elatfy, Secretary General (AWC) and Prof. Walid Abdel Rahman, Vice-President (AWC).
Rapporteur: Dr. Mohamed Dawoud, Senior Water Resources Advisor, UAE.

The objective of this session is to highlight the importance of transboundary water in Arab region with emphasis on the challenges and opportunities in managing the transboundary water.

Panelists:

Name	Organization
H.E. Dr Mohamed Abdel Aty	Minister of Water Resources and Irrigation, Egypt
HE. Tammam Mohamed Raad	Minister of Water Resources, Syria
Mr. Jamal Mohsin Ali	Advisor to the Minister of Water Resources, Iraq
Mr. Sherif Eissa	Ambassador, First Minister Assistance, Ministry of Foreign Affairs, Egypt.
Dr Khaled Abu Zied	Center for Environment and Development for the Arab Region and Europe (CEDARE)

Topics Presented:

The session started by an introductory statement from Dr. El-Atfy saying "There are many challenges, unilateral decisions and violation of international laws, but there are also opportunities for cooperation and common interests".

H.E. Dr. Mahmoud Abu Zeid assured that ooperation in the field of shared and transboundary waters is one of the most important elements of sustainability in the field of water. He added that in light of the recent global biological catastrophes that almost toppled the economies of countries, it has become undoubtedly clear that we are in dire need today, more than ever, for strong and advanced mechanisms to enhance global water security. This is important to bring future generations to sustainable social, economic and environmental development, which need activating global cooperation in various parts of the world, especially in our Arab world in a way that preserves humanity and dignity and ensures the safety and security of our people.

The second speaker was H.E. Dr. Abdel Aty who reminded that Egypt receives 55 billion cubic meters of the Nile water, which is far less than what Egypt needs. He assured that Egypt is with development and building dams within the Nile basin. This happened before in the case of Owen dam in Uganda. It could also happen with the construction of the Ethiopian Renaissance Dam, if it was jointly agreed with Egypt and Sudan, but it has been built unilaterally in a way threatens the two countries. The ongoing way to fill-in the dam storage gives a clear indication of the lack of cooperation from the part of Ethiopia. Opportunities for cooperation are available, but political will must prevail.

H.E. Minister Raad wished that this from could enhance technical, technological and scientific cooperation to develop and increase the capabilities of our countries and societies to confront the negative effects of climate change and the lack of water resources, especially since most fresh water comes from neighboring countries. Especially, in the case of Syria, we suffer from the negative environmental effects which occur at the same time with the disastrous consequences from the terroristic war on our country and the unilateral coercive economic measures imposed on the Syrian people. One of the important factors in cooperation in the field of international waters is the existence of an efficient infrastructure to manage

this water, in a way to let all the parties benefit and in a manner that increases the efficiency of investing in this water, especially if these facilities are constructed after agreement with neighboring countries.

In his intervention, Ambassador Eissa said that Egypt depend absolutely on the waters of the Nile River and other resources are very small. Thus, the state is making a great effort to diversify our its water resources and to improve and rationalize water uses. However, this does not mean that there is an alternative to the river water because the Nile is life for Egypt. He added that, negotiations with Ethiopia began in 2011, but till now they revealed the extent of intransigence of the Ethiopian side and stubbornness in the negotiations. They continue construction and filling the dam unilaterally, which represents a very dangerous situation for Egypt. He reiterated that Egypt seeks development in the Nile Basin countries, which does not harm its water security and in accordance with what is appropriate for the rest of the riparian countries.

In Iraq, Mr. Ali said that the Tigris and Euphrates with its tributaries are the main source of most of the available water resources which originate from outside its borders. Historically water from these sources represents 70% of the water in Iraq to be the base of the Mesopotamia civilization and the life-line of the recent sustainable development. Due to the great expansion of irrigation works and the establishment of dams in the upstream countries of the two rivers, the Iraqi water resources have been subjected to a great shortage that threatens Iraqi water security and agricultural security as well. These expansions and dams were not built in coordination and agreement with Iraq, and a fixed share of the waters of those rivers was not determined in agreement with the participating countries together. With Iran, there is no agreement and no intention to cooperate. Waters of the Qarun River and Kalkha River are cut off by Iran, and this has a significant impact on the provinces close to the Gulf in Iraq, due the reduction of the flow of these rivers. Mr. Eissa concluded by saying that Iraq is taking good steps towards finding other water resources to address such challenges, but cooperation in shared waters must be strengthened and fair laws must be enforced that obligate all parties not to violate or exploit the water rights of other neighboring countries.

Dr. Khalid abu Zeid presented important statistics on water resources and water uses in the Arab Countries. Then he summarized the most important transboundary water issues in the Arab region as: (i) the dependence of some countries, by virtue of their location, on the external shared water resources, (ii) the difference in interpretation of some terms between the upstream and downstream countries, (iii) fair, equitable and reasonable use of the shared water, (iv) not causing significant harm to downstream countries.

Dr. Hammou Lamrani representing LAS commented that there is a great challenge regarding the presence of a new generation of Arab negotiators, and he called upon countries and organizations to work on creating a new generation of empowered

negotiators who are aware of the changes that occur at the level of international law in relation to shared waters.

Conclusions and recommendations:

- 64% of the total available renewable surface water resources in Arab Region are transboundary water shared with non-Arab upstream countries.
- Arab countries that are sharing water resources face real challenges with the upstream riparian countries to get their right and equitable shares of the shared resources.
- Up to date there is no legal agreement/conventions between Iraq and Syria as downstream countries with Turki and Iran as upstream countries while the later two countries are making unilateral actions that significantly reduced the flow of the Tigris and Eufrates rivers which seriously affects the development and socioeconomic stability in these countries and leads to conflict.
- In a water scarce region such as Arab region, cooperation between countries sharing transboundary rivers becomes imperative.
- Ethiopian Dam (GERD) has direct impact on the water resources rights of Egypt and Sudan which has direct and sever impacts on the development and socio-economic stability of more than 150 million people.
- Egypt to implement projects worth $50B to counter the challenges of water scarcity, through implementing programs to improve the efficiency of irrigation water and water recycling mechanisms, and applying modern irrigation and agriculture techniques.
- Egypt supports the development in Nile Basin Countries financially and technically in many water related projects including dams.
- All Arab countries support the rights of Arab Countries that have shared water resources and call to form a lobby to encourage other riparian countries to pursue legal frameworks of international cooperation on transboundary water governance - be it the two global UN Conventions and/or other relevant Basin agreements.
- Need to form an advisory body “Water Diplomacy Council”, under the umbrella of the League of Arab States to support the Arab diplomates and negotiators legally and technically in water related issues.
- Need to build competence and skills in water diplomacy among Arab negotiators being diplomates or technical and legal experts. The Arab Water Academy has developed experience in organizing training on Water diplomacy.
- Establish a body for joint cooperation between riparian countries in various fields of water, food and energy, to boost economic growth, cultural exchange, science and development.
- Develop donor coordination mechanisms in transboundary basins.
- Encourage Countries sharing transboundary water to adopt common standards for relevant water and water use data and analyses, and share the resultant data and research transparently.

Panel Session P2-PS1

Session Title: Sharing water and Benefits for Peace and Development

Conveners: AWC, CEDARE, EWP

Session Officers

Chairperson: Prof. Dr. Khaled Abu Zeid, CEDARE, AWC
Rapporteur: Dr. Amel Azab, AWC

This session focused on the following:
Endorsement of the green and blue water balance for all the Nile River basin upstream and downstream countries.
Negotiations on GERD and the reasons for the Stalemate and prospects for success
Blue Peace Initiative
Water Rights in the Nile from an International Law Perspective

Speakers:

Name	Organization	Title of Presentation
Prof. Dr. Khaled Abu-Zeid	CEDARE, AWC	Sharing blue &green water in the Nile Basin Reflection on the Grand Ethiopian Renaissance Dam
Dr. Mohamed Helal	Ohio State University	"The GERD Negotiations: Reasons for the Stalemate and Prospects for the Future"
Dr. Sameh Afifi	Professor Attorney,Civil and Environmental Engineer	"Egypt's Water Rights in the Nile from an International Law Perspective."
Dr. Mufleh Al Alaween Abbadi	Regional Advisor and Liaison Officer, Water Cooperation, Embassy of Switzerland in Jordan Switzerland in Jordan	"Blue Peace Middle East Initiative"

Topics Presented:

- The session started by a presentation from Prof. Khaled Abu-Zeid on the Nile basin and the water resources in the different basin countries including blue, Green and virtual water and the analysis of the countries benefits from every category. The presentation reflected the endorsement of the concept of green and blue water balance for all the basin upstream and downstream countries.
- The second presentation was given by Dr. Mohamed Helal highlighting the process of negotiation on te GERD since 2011 and the key milestones till September 2021

and the reasons for the Stalemate and prospects for success. The key messages from this presentation was the main reason for the stalemate is the lack of political will while the prospects for success can be achieved by engagement of the international community. The presentation showed a simulation of the filling of the GERD and the combined effects of the filling with prolonged droughts and the long term impacts of the filling. The presenter highlighted the Ethiopian claims on the drought mitigation measures, and defended the Egyptian status where these claims were unrealistic.

- The third presentation was on Blue Peace Initiative by Dr. Mofleh Alaween, where he presented the blue peace initiative for the middle east that is supported by the SWISS agency for development and cooperation. The initiative objective is to close the knowledge gap in efficient water management and enhance the capacity and confidence building, and develop dialogue among partner countries. Then he presented intimate supported research case studies on improving shared water resources management in Tigris river basin, and improving water management in Yarmouk basin, development of the Water Diplomacy Center for research and training and the blue peace Media Lab for constructive water reporting in the middle east.
- The fourth presentation was given by Dr. Sameh Afifi on "Egypt's Water Rights in the Nile from an International Law Perspective." The different international law key items were addressed including: conventions/treaties, international customs, general principals, and juridical decisions from international courts. The presenter highlighted some cases where treaties were abiding and respected by the law. He further discussed the 1902 treaty between Ethiopia and the Egyptian government colonized by Britain which should be binding to Ethiopia and grants Egypt full water rights when it comes to decision making for any and all constructions over the Nile River and its tributaries. Ignoring Egypt's water rights in the Nile River is a severe violation of the 1902 binding treaty. Most importantly, Egypt's water rights are confirmed by Ethiopia's common practice for over the last century. These rights are also supported by international judicial rulings for similar cases.

New ideas and innovations:

- Sharing Blue and Green water in a river basin provides opportunities for cooperation.
- Sharing water and benefits in the river basin as a whole rather than just within the river, including consumptive and non-consumptive uses provides constructive opportunities for equitable utilization of shared waters.

Main Conclusions and Recommendation:

- Green water should be considered as water resources and not only blue water during negotiating water rights.
- The GERD negotiations are no longer technical but political process that is affecting he region and undermining the peace and security in the Nile and Africa.
- Ethiopia refuses to sign any binding agreement but only wants and insists to sign a guideline that can be adjusted any time and gives her the full control on the upstream Blue Nile.
- Operation of the GERD will affect the downstream countries and the filling process will deplete Egypt water resources. If a drought occurs during the filling of GERD (where the filling itself is considered an artificial drought) this will be a worst case scenario for Egypt and Sudan where a water shortage of about 120 BCM will be lost.
- The structure of the Dam and the design safety protocols are not shared with Egypt and Sudan according the Technical Committee recommendations in 2013.
- Ethiopian political will is imperative to end the stalemate and increase the prospects for achieving success of the negotiation Egypt and Sudan regarding the filling and operation of GERD.
- Work is needed to develop an very strong agreement to mitigate the extended long-term impact of filling the GERD.
- Engage the regional and international organizations in mediation between countries to reach a win-win solution and to ensure equity and no harm rules.

Panel Session P2-PS2

Session Title: Interconnected Innovations for Managing Water Scarcity to Enable Sustainable Food Security in the UAE

Convener: FAO/SNG
Co-conveners: IWMI, TU Delft, KTH, SEI and ICID

Session Officers
Chairperson: Mr. Dino Francescutti, Director, FAO-SNG
Co-Chair: Mr. Essa A. Al Hashemi, Office of the Prime Minister of the UAE
Moderator: Dr. Waleed Abou El-Hassan, Senior Water Resources Management, FAO-SNG
Rapporteur: Dr. Amgad Elmahdi, Director, MENA Region-IWMI and Dr. Kamel Amer (AOAD)

The objective of the session is to present and share information regarding interrelated technologies for managing water resources in a sustainable manner in order to increase productivity. It examined the opportunities that lie ahead as well as the requisite changes.

Speakers:

Name	Organization	Title of Presentation
Ibrahim	Tanquia	Measures for Rationalization of Water and Wastewater Use
Dino Francescutti	FAO-SNG	Welcome Remark
Essa A. Al Hashemi	Prime Ministers' Office of the UAE	UAE Water Security Strategy 2036
Jules van Lier	Delft University of Technology	Reclaiming irrigation water from domestic sewage: technology selection
Francesco Fuso-Nerini (KTH) & Annette Huber-Lee (SEI)	Swedish Royal Institute of Technology & Stockholm Environment Institute	Integrated water-energy-food nexus modelling including energy used for pumping, desalination, and wastewater treatment
Amgad Elmahdi	IWMI	Future of Water accounting in the UAE
Ragab Ragab	ICID	International experience of smart irrigation using new technologies and good agricultural practices to be implemented in the UAE

Lionel Dabbadie	FAO-SNG	Integrated aquaculture for optimizing water use and increasing productivity for food security in UAE
Dr. Waleed Abou El-Hassan	FAO-SNG	Messages

New ideas and innovations:

- Water–Energy–Food nexus is a smart approach to maximize the revenue from natural resources.
- Smart agriculture brings high benefit to the agricultural sector.
- The use of precision fertilization will result in economic and environmental benefits.
- Water accounting improves public awareness.

Main Conclusions and Recommendations:

- By launching the National Food Security Strategy 2051, the UAE aims to achieve zero hunger by ensuring access to safe, nutritious and sufficient food all year round. The strategy specifically aims to implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems.
- Treated sewage is an alternative water resource
- Sometimes integrated approaches are not possible at the farm level, because of the burden that managing multiple crops creates. But with smart spatial planning and effective partnerships between operators, it is perfectly possible to manage a food production system spatially integrated with various operators. It will be also possible to produce more food, in a resilient and sustainable manner.
- A set of interventions following a nexus approach can improve outcomes in all sectors
- There are two measures for achieving Water Conservation: Voluntary Measure; and Enforced Measures.
  a. Voluntary Conservation: This measure is achieved voluntarily in response to awareness campaign; and
  b. Enforced Conservation:
     - Achieved through enforcement of Building Codes for use of water-saving and optimized water-consuming equipment.
     - Increase Water and wastewater Tariffs based on water consumption block rates (Price Elasticity of Demand)
- Planning on a sectoral basis can have negative impacts on other sectors
- Water reuse for agricultural faces several challenges to be addressed:
  - Insufficient investment and weak institutional capacity
  - Absence of proper legislative frameworks
  - Many different agencies are involved in water reuse with contradictory objectives and overlapping responsibilities

    - Important stakeholders like ‘farmers’, and ‘users’ are often not involved
    - Environmental and health aspects are not well studied
    - Technical level at responsible institutions is often insufficient
    - Integrated approach required for optimal use of available water
- Available treatment technologies can address any pollutant of concern. However, high effluent qualities require high Capex and Opex costs. Water conditioning might be required.
- In addition to water, sewage-based nutrients (N, P, K) are present in concentrations ofinterest(ferti-irrigation)
- Improved water productivity and reduced non-revenue water have benefits across both the water and energy sectors
- The ability to plan across sectors requires coordinated governance
- The way forward for the countries in the desert and arid areas will probably be to expand and upscale integrated aquaculture, both in freshwater, brackish and marine water.
- There is need for innovation and the countries located in arid and desert areas will have to invent their own integrated aquaculture, their own species, tailored to their own needs
- National water Account – Tailored, integrated, detailed, standardized and systematic.
- Water Accounting will help to answer customer and other stakeholder questions on water resources management and planning.
- Water Accounting will help to address water security and changing supply and use in metropolitan cities and irrigation areas.
- Water Accounting will help to provide data checking and quality control for other products.
- Provides national comparison using water Accounting.

Cross Cutting Session P2-CC1

Advanced Technologies and Early Warning Systems to Improve Agricultural Water

Conveners: ICBA, ICARDA, ICID

Session Officers
Chairperson: Dr. Khalil Ammar
Rapporteur: Eng. Rashyd Zaaboul

The objective of this session is discussing innovations and techniques used to better manage water resources and agriculture under water scarce conditions in MENA region. The focus is on transboundary water management.

Speakers:

Name	Organization	Title of Presentation
Dr. Khalil Ammar	ICBA	Improving Agricultural Water Productivity under drought and marginal conditions
Eng. Rashyd Zaaboul	ICBA	Drought Monitoring and Early Warning Systems for MENA region
Dr. Chandrashekhar Biradar	ICARDA	Digital Dynamism for Agriculture Water Management in Drylands
Dr. Marco Arcieri	ICID	Innovations in irrigation technology under the threat of climatic change in the Mediterranean area

New ideas and innovations:

- Use of remote sensing combined with energy balance modeling and machine learning techniques to better assess water use, water efficiency/productivity, and crop production
- Digitalization of the agricultural system through remote sensing and modeling showed encouraging results to manage water and crops at farm level
- Replacement of open canals by pipelines, automation of water delivery systems, and use of ultra-low drip irrigation increase irrigation efficiency

Main Conclusions and Recommendations:

- Climate-resilient crops are helping smallholder farmers to decrease negative impacts of salinity and climate change
- Crop water requirement and crop water productivity are assessed in Tigris and Euphrates.
- Remote sensing and Machine Learning techniques used to increase water productivity.

- Human induced changes of terrestrial nature increased exposure to erosion and led to more aridity. In addition, rainfall decrease and increased temperature exacerbated the situation.
- Water used by agriculture is higher in the southern part of the Mediterranean region than in the north
- Modern governance framework regarding water resources management empowered with early alert monitoring systems, taking into account demand coming from different sectors on the one hand, but also capable of solving potentially conflicting situations arising between transboundary regions, on the other, is a “must have” condition to guarantee valuable results for rural communities.
- Drought conditions are expected to increase under future climate conditions. Therefore, there is a need for improved drought monitoring and early warning systems along with improved water management systems in the Arab region.
- Intersectoral as well as inter- and intra-regional collaboration are needed to better manage water especially in transboundary situations.
- Remotely sensed data and modeling techniques are bridging the gaps in water productivity enhancement and are helping decision-makers to better manage this scarce resource along with improving smallholder farmers’ livelihood.
- Arab region needs digital augmentation in agriculture driven by remote sensing, machine learning, and artificial intelligence combined with multi-stakeholder partnerships, including recruiting citizen science and seemingly subjective indigenous knowledge to provide essential entry points for scaling system resilience for improved water productivity across the scales.
- Water use efficiency is necessary for increased agricultural productivity. Modern criteria in advanced irrigation, spanning from state-of-the-art water delivery services all the way to innovative irrigation scheduling systems, are indispensable to ensure food security.
- Transboundary water in the Arab region needs improved inter-states collaboration and enhanced digitalization for monitoring purposes. Storage should be well- planned and reflected in the basin masterplan taking into account the contribution of all riparian partners.
- Stormwater/surface water harvesting is important alternative source of water but should be managed in a way that reflects the optimal use of this valuable resource. A map of potential rainfall/runoff water harvesting sites should be established on a regional, national, and basin levels.

Panel Session: P2-PS3

Session Title: Regional Cooperation & Coordination in Managing Shared Basins: Opportunities

Conveners: Ministry of Water Resources - Iraq

Session Officers

Chairperson: Jamal Mohsen Ali, Technical Advisor to the Minister of Water Resources, Iraq

Rapporteur: Eng. Luma Khalid Majeed, Iraq and Dr. Mona Elagizy (AWC)

The objective of the session is to focus on the sustainable management of transboundary wetlands and challenges facing the Iraqi marshes conservation.

Speakers:

Name	Organization	Title of Presentation
Jamal Mohsen Ali Technical Advisor to the Minister	Minister of Water Resources, Iraq	Opening Speech
Eng. Suray Abdel Hameed Rasheed, Chief Engineer	Ministry of Water Resources, Iraq	Sustainable Wetland Management
Dr. Luay Ali Hussein, Political Consultant	Ministry of Water Resources, Iraq	A detailed study regarding the proposal to establish an alliance of downstream countries (DSA)
Zainab hussein khairullah, Chief Engineer	Ministry of Water Resources, Iraq	Land and Water Resources Strategy in Iraq
Dr. Luay Ali Hussein, Political Consultant	Consultant	Towards a Cooperation for Stabilizing Iraqi Water Flow
Laith Abdul Sattar, Deputy General-Director	Ministry of Water Resources, Iraq	Conclusion & Closing remarks

Topics Presented:

First Presentation: Sustainable Management of Transboundary Wetlands

- Wetlands play a vital role in the economic and social advancement of the people of Iraq.
- Support sustainable financing mechanisms through private sector to achieve water wise use.
- The issue of the Iraqi Marshlands is one that goes to the core of Iraq's trans-boundary challenges with its neighbors since the revitalization of the Marshlands

is largely dependent on the constant in-flow of fresh water.
- Local people awareness increase contributes and support active marshlands management plan.

Second Presentation: Establishment of Downstream States Alliance (DSA)
- The alliance would be a knowledge-motivated driver among these states, and an international platform for them.
- Forming the alliances is not against states, but the implications caused by them.
- Supporting and enhancing the soft power or the persuasion capabilities for the downstream countries or creating a counter-discourse in order to balancing with the upstream' discourses
- The alliance would be in the line of the international commitments.
- Withdrawing water issues from the political arena by emphasizing socio-economic and humanitarian aspects.

Third presentation: Towards a cooperation for stabilizing Iraqi flow
- An unstable political situation shaped the interaction between the riparian states to be characterized as semi-cooperation.
- Joint Technical Committee (JTC) worked as a useful communication channel between the riparian states.
- Lacking data exchange between the riparian states (or politicizing data and information) would paralyze an attempt to develop concrete coopetition among them.
- Riparian states need a trilateral not bilateral gathering which might further complicate their water issues.
- Transforming the negotiation from the solely water rights (zero-sum game) to water need drove Turkey and Iraq to cooperate more feasible recently

Forth presentation: Strategy for Water and Land Resources in Iraq
- Integral Management of Water Resources is essential
- Iraq suffered from decreased water imports.
- Plan objective is to optimize water and land resources management using modern technologies and advanced planning tools.
- The main challenge is the location of Iraq at the downstream of the Tigris and Euphrates made it suffers of disputes over securing its water share (quantity and quality).
- Iran continues to implement dams and irrigation projects and divert the courses of rivers.

New ideas and innovations:
- Marshlands ecosystem services and the social, economic, and cultural benefits they provide to the Iraqi people are important to be promote.
- Integration between agricultural resources and wetlands, especially in the overlapping areas between agricultural lands and marshlands
- Establishing an alliance encompassed of states which are located on the lower of the watercourses.

- Establishing an alliance of downstream states of international rivers is a knowledge-motivated driver among these states, and an international platform for them.
- Water security needs adopting modern irrigation methods and lifting abuses on irrigation facilities to reduce water wastage

Main conclusions and Recommendations:

- Issue of water should not be politicized and emphasize should be on the human, environmental and social aspects.
- The urgent need to strengthen cooperation, dialogue and coordination in the integrated management of international shared basins. In addition exchange information and data between riparian countries to ensures the preservation of environmental flows.
- Emphasis on the legal personality of the transboundary river by activating the application of the IWRM principles and urging the stakeholders to rationalize the consumption.
- Emphasizing the need to ensuring the continuity of water flows to sustain wetlands in order to preserve their biological diversity and revitalize their ecosystem.
- Serious and effective cooperation in implementing the principle of harm-sharing between both the downstream and upstream countries and working together to limit the effects of climate change.
- Depoliticizing water issue by emphasizing its human, environmental and social aspects.
- The river diversion strategy carried out by the upstream countries is considered a great and dangerous challenge that negatively affects the sustainability in Iraq.
- Establishing a “Downstream state Alliance” to be a platform for downstream countries for communicating their demands and rights in the international forums.

Panel Session P2-PS4

The future of water: Hopes and Concerns

أكاديمية البحث العلمي والتكنولوجي
Academy of Scientific Research & Technology

Conveners: Academy of Scientific Research and Technology, Egypt

Session Officers
Chairperson: Prof. Mahmoud Sakr, ASRT President
Rapporteur: Dr. Mohamed Ramadan A. rezk

This session objective is to be an opportunity for gathering eminent Scientists, experts, researchers and public audience, to brain storming future of water as a global challenge.

Speakers:

Name	Organization	Title of Presentation
Prof. Mahmoud Sakr,	President, Academy of Scientific Research And technology	The future of water in Egypt: Hopes and Concerns
Prof. Hesham Bekheet	Cairo University	challenges and Opportunities for water resources management in Arab world
Prof. Hesham As Askary	Chapman University	Earth observations addressing water resources and agriculture
Dr. Mohamed Ramadan,	Academy of Scientific Research And technology	The Role of foresight in Building and maintaining the water security
Ms. Ekram Essawi	Academy of Scientific Research And technology	International cooperation in water research: success stories and common strategies ,

Topics Presented:

The speakers discussed the importance of foresighting in anticipating and maintaining water security, ethical and environmental aspects of cross borders mega projects, accessibility of clean water for every one as one of the human rights and SDGs, and the role of collaborative international research, development and innovation (RDI) projects to mitigate possible water shortage and desertification. Finally, they reviewed some ongoing RDI projects in the field of water, energy and environment nexus running at the Academy of Scientific Research and Technology, Egypt, and open to regional and continental collaboration.

New ideas innovations:

- Using the concept of virtual water and achieving Arab cooperation to bridge the water and food gap.

Main conclusions and Recommendations:

- The session topics are diversified towards achieving water security
- The role of the Egyptian Academy of Scientific Research and Technology in maintaining Egyptian water security and the research projects it undertakes,
- International cooperation is very important in maintaining water security
- The use of remote sensing is very important in water security monitoring activities
- The session also showed the Egyptian Europe collaboration project in water
- Foresight is one of the most important tools to help decision makers
- A proposed new initiative under the title Arab Africa water RDI partnership for better life between the Academy of Scientific Research and Technology and the Arab Water Council
- Agricultural policies should be modified, and water efficiency improved.
- The world focuses on human rights, which can only be achieved through achieving water security. Cooperation of scientists in the countries of the world helps to achieve this goal.
- International cooperation is very important in maintaining water security
- Agricultural policies should be modified to address food security, and water efficiency improved to achieve water security.
- The use of remote sensing is very important in water security monitoring activities
- Foresight is one of the most important tools to help decision makers
- Using the concept of virtual water and achieving Arab cooperation to bridge the water and food gap

Scientific Session, P2-PSS1

Session Title: Transboundary Water Cooperation

Convener: AWC

Session Officers
Chairperson: Prof. Dr. Walid Abdel Rahman, Vice President AWC
Rapporteur: Dr. Amel Azab, AWC

The objective of the session is to provide a platform for researchers to present their research findings in subjects related to the 5th forum themes.

Speakers:

Name	Organization	Title of Presentation
H.E. Prof. Dr. Ayman Abu Hadid	Ain Shams University, Faculty of Agriculture	The Nile Basin conflict or cooperation
Prof. Adly Saadawy	Fayoum University	The repercussions of the Grand Ethiopian Renaissance Dam on water resources and the agricultural sector in Egypt
Prof. Mekki Abdellatif Omer	AOAD, Khartoum Sudan	Demonstrating Water Harvesting Techniques to Bridge Agricultural Water Deficit in Darfur, Sudan
Mrs. Hassina Sellami	PhD researcher, Algeria	Sustainable Management and Development of Shared Water Resources in the Arab Region

Topics Presented:

The session started by an introductory Speech by the Chair Prof. Walid Abderrahman on the trans boundary river basins and the conflict in shared international Arab Rivers. He highlighted the importance of converting the shared river basins to cooperation platforms to achieve sustainable development, prosperity and water security for all neighboring countries through collaboration with positive spirits that protect the rights of all countries in the development and the historical share of each country. Professor Walid explained the negative impacts of the reduction of water shares of Iragq , Syria and Somalia on reduction on cultivated areas and reduction in food production and migration of farmers and its serious socio economic impacts. He also warned from the impacts of uncontrolled filling of GERD dam by Ethiopia and its serious impacts on agriculture, food production, drinking water security, electricity generation which makes the future of sustainable water, food and energy security impossible to achieve in Egypt and Sudan. Professor Abderrahman stressed on the sole exit from the crises is converting the shared river basins to platform of cooperation in all Shared Arab river basins highlighting the many expected benefits for all riparian countries.

The first speaker was Prof. Dr. Ayman Abu Hadid, the former Minister of Agriculture of Egypt focusing on water resources management in Egypt emphasizing deficit caused by the climate change impacts and the population increase. He also described the irrigation and drainage systems in Egypt and the efficient use of water highlighting the new irrigation modernization project in 5million Feddan to enhance the agricultural production by using new irrigation technologies and lining the canal systems. The presentation also highlighted the need for cooperation between the riparian countries where Egypt can transfer the knowledge and expertise for agriculture and livestock development to the sister riparian countries and the upstream countries find markets in the downstream countries. Egypt can also help upstream countries in building infrastructure facilities for livestock and its associated industries and transferring innovations in the production of wheat in the upstream countries that can be trade to the downstream countries.

The second presenter was by Prof. Adly Saadawy, and his presentation focused on the repercussions of the Grand Ethiopian Renaissance Dam on water resources and the agricultural sector in Egypt. He explained the expected economic impacts of the GERD on the Egyptian agricultural sector according to two scenarios that might occur due to the rate of Dam filling. The impact is expressed by the percentage of decrease of total production of crop groups and in net agricultural trade. His research results showed a decrease in exports and increase in imports to compensate the deficit of agricultural production. The presentation reflected also the decrease in the livestock feed which will impact the livestock industry.

The third [presentation was a case study from Sudan presented by Prof. Mekki on water harvesting techniques to bridge agricultural water deficit in Darfur Sudan, to sustain food production towards improved livelihood. The presentation highlighted the water demand in Darfur, the livelihood activities, the traditional farming systems and the challenges facing the communities. He then explained how a new project on water harvesting can lead to improvement of production and people livelihoods with specific support to women groups. The project also provides technical and in kind supports for water harvesting and improved seed varieties and grain yield.

The last presenter was by Dr. Hasina salami who gave a presentation on Sustainable Management and Development of Shared Water Resources in the Arab Region from a legal perspective. She highlighted the importance of cooperation to find institutional, legal and financial mechanisms for sustainable development, and the role of international cooperation to reach this sustainable development.

Smart ideas and/or innovations:

- Egypt can transfer to upstream Nile countries technology, knowledge and expertise to improve water productivity, crop production, livestock through improved water management, modern irrigation systems, advanced agriculture practices and livestock development.

- Egypt can provide an exit for the Nile basin counties to export their agricultural and livestock products and support them to open new markets in other countries which helps them in achieving prosperity and economic growth.
- Mapping water uses along the Nile basin to identify the water needs and evapotranspiration for the different agricultural products enables managing the available water resources in an efficient and effective way.
- Innovation platforms with informed consortia can expand investments in technologies on water harvesting and crop yield.

Main Conclusions and Recommendations

- Egypt has a wealth of knowledge that can benefit the Nile basin countries in water and agricultural development but there is a need for cooperation and political will from the partner countries.
- Egypt can provide development ideas and tools in agriculture, livestock and associated products for mutual benefit to all partner countries.
- It is recommended by the chairman Dr. Walid that presentations by Prof. Abu-Hadid and Prof. Sadawy be used as supporting documentations to the negotiations between riparian countries as motivation for possible future cooperation. The two documents can be endorsed by the "a Technical Authority of Water Diplomacy", an initiative recommended to the Council of Arab Ministers to be hosted under the umbrella of the Arab Water Council.
- Egypt is not against development in Ethiopia or any riparian country in the Nile Basin but it is against causing negative impacts due to unilateral actions of building dams which threat future and lives of the Egyptian people.
- The shared Arab river basins should be converted to platforms of cooperation between the riparian countries to achieve sustainable water, food and energy security in addition to prosperity of all countries.

Cross Cutting Session P2-CC2

State of the Water in the Arab Region

Conveners: AWC, LAS, CEDARE, UNICEF, AOAD

Session Officers

Chairperson: Prof. Safwat Abdel-Dayem, Senior Advisor & Governor, AWC
Rapporteur: Eng. Mona Elagizy, AWC

The objective of the session is to focus on the status of water resources in some selected Arab region such as Egypt, Jourdan and UAE.

Speakers:

Name	Organization	Title of Presentation
Dr. Khaled AbuZeid	CEDARE - AWC	"State of the Water in the Arab Region"
Dr. Kamel Amer	AOAD	"Arab Sustainable Agriculture Development Strategy 2020-2030, Considering Limited Water Resources"
Dr. Chris Cormency	UNICEF	"Progress on Drinking Water, Sanitation & Hygiene: five years into the SDGs"
Dr. Mohamed Al-Mulla	Ministry of Energy and Infrastructure, UAE	"State of the Water in the UAE"
Dr. Adel Al-Obeiaat	Ministry of Water Resources, Jordan	State of Water in Jordan
Dr. Jihad Kaman	Syria	State of the Water in Syria

Topics Presented:

First presentation: "State of the Water in the Arab Region"

- State of the Water Report for the Arab Region, updated for the year 2020. Updated information include precipitation, green water uses, water for rain fed agriculture, rain fed forest consumption. Other information still being collected for 2020
- In 2020, 13 countries out of the 22 Arab countries were below severe water scarcity limit of 500 m3/ person/year of blue renewable water resources. In addition, 18 countries of the 22 countries were below the scarcity limit of 1000 m3/person/year compared 17 countries in 2015.
- Climate change from 2016 to 2020 was reflected in an increase in number of floods

- Virtual water in food imports in 2017 was 342 BCM and 361.15 BCM in 2019 but decreased in 2020.
- Agricultural exports increased from 2017 to 2018, peaked in 2019 and decreased in 2020.

Second Presentation: "Arab Sustainable Agriculture Development Strategy 2020-2030, Considering Limited Water Resources"

- Key objectives of the Arab Sustainable Agriculture Development Strategy 2020-2030, by AOAD include increasing efficiency of agriculture and fish products, boost food security, eradicate poverty, and boost technical knowledge.
- Traditional irrigation process results in losing 50% water, adding pressure on water resources
- AOAD main focus includes efficient use of water resources in horizontal and vertical expansion, sustainable food security and following up on its KPIs, ensuring sufficient investments, higher production rates, and water quality.

Third presentation: "Progress on Drinking Water, Sanitation & Hygiene: five years into the SDGs".

- UNICEF develop Documents for SDG for the Arab Region.
- Over 48 million don't have access to safely managed drinking water mostly in rural areas.
- In 2020, 48 million people lack basic drinking water, and 71 million people lack basic sanitation services. The region is not on track for achieving the 2030 SDGs and require doubling investment and efforts to achieve the SDG 6.5.1 and 6.5.2
- No much data on hygiene in the Arab region but mostly follows the same trend as drinking water and sanitation.
- The SDG will not reach the targets without increasing the speed the rate of sanitation coverage 4 folds.

Fourth presentation: "State of the Water in the UAE",

- Water demand of UAE is 5BCM/Y provided from groundwater and desalination
- Desalinated water is traded between companies
- Treated wastewater facilities are increased, now more than 50% is reused and the rest goes to the sea and there is potential to increase reuse.
- Surface water & dams: able to cope with drought and wet years
- UAE strategy for 20 year ahead includes, increase water resources, managing water production, wastewater, groundwater management, development and capacity building, research and policies,
- The target is to reduce water demand by 21% (WSS 2036), increase supply from desalination and reduce reliance on groundwater, except for emergency
- Reduce need of energy in desalination per unit of water / reduce carbon footprint for desalination and utilize clean energy

Fifth Presentation: State of the Water in Jordan.

- Reported on the status of the SDGs
- Reported on the share of water per person in various sectors

Sixth intervention: "State of the Water in Syria" (no presentation)

- State of drought prevailed
- Turks have decreased water flow to Syrian border by half resulting in difficulty to supply water to citizens.
- For 11 years, water infrastructure lacked maintenance
- Strategy is need to water sources such as through desalination.
- There is a big gap of knowledge, skills and expertise within the water sector.

New ideas and innovations:

- Target to reduce water demand.
- Diversify sources of water supply.
- Increase treated wastewater reuse
- Trading desalinated water to stop monopoly

Main Conclusions and Recommendations:

- The Lead role of AWC and CEDARE in compiling and publishing the "State of Water in the Arab Region" report deserves more support from all country water authorities and regional and international organizations.
- Reporting on the "State of Water in the Arab Region" constitute important step towards improved water governance in the region.
- Country reports on the state of water is important contribution towards having an integrated view of the state of water in the region to develop a regional strategy for sustainable water resources management.
- Strategic water storage protects scarce water countries against drought conditions derived by future climate change.
- The Arab region will not reach the targets of the SDG without increasing the speed of necessary actions to achieve the set goals.
- The state of water and water services in Syria reflects great suffering of the Syrian people due to internal and external water severe stresses.
- Reporting on the State of the Water is important and there should be efforts to integrate the work of organizations on the progress of SDGs related to Water in the region.
- The State of the Water in the Arab region report provides not only sets of information but it is also a unique example and opportunity in presenting innovative indicators for defining the State of Water.
- State of the Water Reporting needs to be a regional priority for the Council of Arab Water Ministers under the umbrella of the League of Arab States

- Water stress indicator SDG 6.4.2 reflects water scarcity in the region and also reflects the efforts to fill the water gap with non-conventional water resources (i.e. reuse, desalination)
- Green water resources assessment and utilization is an integral part of the available water resources and need to be given due attention in assessing the state of renewable water resources indicators.
- Water security is great challenge for the Arab countries but there is many opportunities to bridge the water gap
- Arab countries need increase investments in water projects to accelerate the pace towards achieving the SDG targets. Necessary actions include increasing sanitation coverage, reducing water demand per person, increase supply from desalination and treated wastewater.
- Reduce reliance on non-renewable groundwater resources, keeping it for emergencies.
- Reduce use of energy in desalination per unit of water, reduce carbon footprint for desalination and utilize clean energy.

Panel Session P2-PS5

Session Title: Report Launch, "Water in the Shadow of Conflict"

THE WORLD BANK
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Conveners: World Bank (WB)

Session Officers
Chairperson: Anders Jägerskog (WB)
Rapporteur: Mariela Sánchez Martiarena (WB) and Dr.Tina Jakolski (UNDP)

Session objective was to launch the World Bank report 'Ebb and Flow: Water in the Shadow of the Conflict in the Middle East and North Africa' and share its key messages with the audience.

Keynote Speaker: Anders Jägerskog, World Bank

Other Speakers:

Name	Organization
Roula Majdalani	United Nations Economic and Social Commission for Western Asia (UN-ESCWA)
Alan Nicol	International Water Management Institute›s (IWMI)
Michael Talhami	International Committee of the Red Cross (ICRC)
Kareem Al-Sharabi	West Asia-North Africa Institute

Topic Presented:

- The World Bank report examines the links between water risks from droughts and floods to lack of sanitation, conflict, and forced displacement.
- The report aims to increase understanding of how to address the vulnerabilities of forcibly displaced persons and their host communities, and to identify water policies and investment responses. All panelists agreed that migration has been foundational for development.
- In the ICRC's approach to providing water services to people affected by armed conflict and violence, the organization has identified three key challenges arising in urban settings:
  - scale and impact of conflict,
  - complexity of urban services (wastewater for example),
  - duration of armed conflicts
- According to the West Asia North Africa Institute, in MENA's forced displacement crises, it seems that attitudes towards forcibly displaced within host communities differ depending on the incoming refugee group and time. In the case of Jordan, there has been some resentment about wages following aid coupons for rent or food given to migrants. Some host communities feel the incoming refugees are in a more advantaged position than they are.
- According to UNESCWA, there is agreement that there is more cooperation than conflict over water. However, it is a rather passive sort of cooperation. Neutral third-party organizations such as the UN or the WB should support countries in working on the full spectrum (sharing knowledge, developing joint projects or initiatives, especially in transboundary contexts). Maintaining the trend of multistakeholder platforms will also be key for the good governance of water management.

New ideas and innovations:

- More resilient infrastructure, building in redundancies, diversifying sources and trying will ensure delivery when there are destabilizing events such as wars or natural hazards.
- Ensuring electricity supply, elaborating emergency preparedness plans along with asset inventories, as well as monitoring and data collection will be key to sustain water provision prior, during and after conflict or hazards.
- The WB report unpacks the complexity around water and migration and adds nuance, which can help shape the debate about migration.
- Although the topic is often framed by the media as a 'problem', it can also be a solution driving positive outcomes

Main Conclusions and Recommendations:

- The Middle East and North Africa (MENA) is a transit zone for migration (coming from Sahelian Africa for example), so political economy aspects must be also taken into account.
- Water impacts the lives of the forcibly displaced and their host communities. It also plays an important role in the perception of these host communities, but it is not ranked as high in the list of concerns as the economic impacts and competition arising from incoming migrants.
- Development actors need to find holistic ways to address the needs of the populations in conflict-affected countries by going beyond the emergency scenarios while also responding to the long-term needs related to water and sanitation service providers. Increasing the resilience of these populations by providing them with more durable solutions will be crucial when building back better too.
- The World Bank hopes this 'Water in the Shadow of Conflict' report will inform its lending portfolio in the MENA region and elsewhere.
- Humanitarian, development and security actors should work better together, so that their efforts build upon each other while improving the water sector, among others.
- In MENA water is more often a victim and casualty of conflict – rather than a primary source of conflict.
- Contrary to popular belief, water risks have historically led more to cooperation than conflict both at national as well as international level.
- The MENA region urgently needs to move towards water resilience.

Cross Cutting Session P2-CC3

Title of the session: Impact of Research, Technology and Innovations on Water Productivity

Conveners: IWMI and ICID

Session Officers

Chairperson: Dr. Amgad Al Mahdi, IWMI

Moderator: Eng. Adham badawy, IWMI and Dr. Amel Azab

The session was focused on role of innovation, tools, and technology for better water productivity, and exchanging the best practices for increasing agricultural production.

Speakers:

Name	Organization	Title of Presentation
Dr. Amgad El Mahdi	IWMI	Opening remarks
Eng. Marwa Ali	IWMI	IRWI App an e-friend for Egyptian farmers
Dr K Yella Reddy	(ANGR Agricultural University)	Agricultural Water Management: Best Practices, Policy Framework and Way Forward
Dr WU Wenyong	(IWHR)	Reclaimed water irrigation research: retrospect and expectation
Nafn Amdar	(IWMI)	Assessing Water Losses from Evaporation using Remote Sensing, case of Northern Jordan

Panelists:

Name	Organization
Domitille Vallée	(FAO)
Dr. Alok Sikka	(IWMI)
Dr. K Yella Reddy	(ANGR Agricultural University)
Er. Ashwin B. Pandya	ICID
Dr. Harish Kumar Varma	ICID

Topics Presented:

1. The session started by opening remarks from Dr. Amgad El Mahdi where he highlighted purpose and objectives of the session.
2. Four presenters from (Egypt, India, China and Jordan) gave case studies on developed innovative technologies and tools including:
   - Egypt Case: Presenting the IRWI app for farmers to enhance the using of

ICT platforms to support water management and productivity. The app is a user friendly mobile application that provided daily information to farmers on cropping and irrigation water requirements with a geographic coverage of Egypt as a pilot country.

- India case: presenting the smart agriculture water management best practices and policy framework. Where the presentation focused on national water policy, enhancing water availability and demand management approach, the national water footprint and the virtual water uses and the presenter gave an overview of the water saving crop production technologies used in India.
- China Case: the presentation highlighted the use of different unconventional water resources in China such as the reclaimed water irrigation, the brackish water irrigation and focused on the expected levels of use at 2030, and also the presenter highlighted the use of safe irrigation technologies and strategies and the feasibility of using the different technologies and the suitable crops for each type.
- The fourth presentation from Jordan showed a case study on informing better investments in Water Saving technologies., where the study focused on the selection of the suitable evaporation reduction technologies based on cost versus water saving analysis. Where the use of hexagonal overs is more cost efficient as a technology for reduction of evaporation of open surface water bodies.

3. The panel discussion focused on many areas to support innovation and research and the recommendations and key messages are highlighted at the end of the report

Smart ideas and/or innovations:

1. The IRWI app is an initial attempt at developing a mobile application that can provide farmers with technical support regarding irrigation time, frequency and crop productivity.
   - The use of water saving crop production technologies in India such as direct seeding, AWD Tubes, flumes and water meters and the use of micro-irrigation techniques.
   - Cost versus water saving analysis to choose the optimum evaporation reduction technology.

Conclusions and recommendations:

- Non-Conventional Water Resources Irrigation (NCWRI) is important for food security in china and may be also in other countries facing shortage in water supplies.
- The safe reuse strategy is an important subject for in-depth research to avoid hazard risks. Innovative research should answer the needs of the end users
- (NCWRI) should be included in the planning and allocation for agriculture as the conventional water resources.

- Management pf non-conventional water resources should be strengthened by improving Law, guidelines, policies and standards..
- Solutions and innovations should be sustainable and not only meant for solving present problems.
- Effective management need to help communities to absorb and understand the adoption of new technologies.
- Feedback process from end users is important in the development of the technologies and innovations.
- Provide end users of non-conventional water with financing modules, grants and technical assistance.
- Demand management is a key for efficiently managing water resources not only focusing on supply management.
- There is a need for good case studies and demonstrations and concrete bottom-up evidence to show that good research leads to innovative technologies for water management.
- Cooperation between ministries responsible for water and agriculture is important for developing strong policies and strategies.
- Strengthening partnerships with private sector whose role of and startups are important to support the research that leads to the development of innovative tools and methods for water management
- Political will is needed to overcome bottlenecks in implementing innovation and technology for water productivity.
- There is a need for financing tools to support research and innovative ideas.
- Women empowerment is key in the agricultural sector and supporting them with technical capabilities boost their role.
- Cooperation and coordination between the irrigation and the agricultural sectors is needed to attract the private sector to invest in the new developed technologies.
- Policy Dialogues are crucial to find solutions and set the proper policies and strategies.
- There is an important and vital role for the regional innovation Hub developed by IWMI in supporting the development of new technologies.

First Science-Policy Dialogue on "ReWater-MENA" Project: More and Safer Water Reuse in the MENA Region

Conveners: IWMI, LAS, CEDARE, FAO

Session Officers
Rapporteur: Prof. Aly El-Bahrawy

Meeting Over View:
Introduction statements to Water reuse in the MENA Region started by a welcome remark by Dr. Hosein El-Atfy, (AWC) followed by Dr. Hammou Elomrani (LAS) to review the agenda. Dr. Nesrine El-Lahham, Project Manager (IWMI) gave a speech about the projects details and its activities including three case studies in Egypt, Lebanon and Jordan. Another speech was given by Mr. Khafir from IWMI reviewing the status of wastewater treatment in the Arab region with a database of 307 case studies and the existing projects.

A session of questions and answers followed which showed the importance of the subject and need to update the numbers mentioned in the presentation.

After lunch, the second session was organized in the form of working groups discussions and interactive Exercises. The participants were divide into three working groups. Each group includes different countries and organizations with two facilitators and one reporter. All groups were given the same assignment to come up with their views about: (i) number of challenges for water reuse at the regional level and to rank them, (ii) Policy Options and Innovative Solutions for more and safe water reuse at regional level related to the agreed challenges, and (iii) Enabling Environment for Policy Change at regional Level and role of entities/ Influencers. The working groups discussions were very intense and laptops are used by the reporters to put the findings on a spreadsheet.

The last session on Outcomes and Conclusions started with reports from the group facilitator reporting the top two challenges and their solutions and policy changes needed. Each challenge includes technical, institutional and social issues.

The summary of such presentations shows that the three groups came up with both different and similar outputs, reported without discrimination as follows:

For challenges

- Low-cost technologies for wastewater treatment
- Lack of local standards
- Public acceptance and awareness
- Reviewing and updating existing guidelines
- Allocation of land through government mechanisms
- Technical data availability and data bank development
- Appropriate technology for intended water reuse (quality- storage)
- clear definition of responsibility and accountability
- Lack of competencies and proficiencies in the wastewater treatment
- High cost of treatment and low cost recovery
- Psychological and religious perceptions

For Solutions

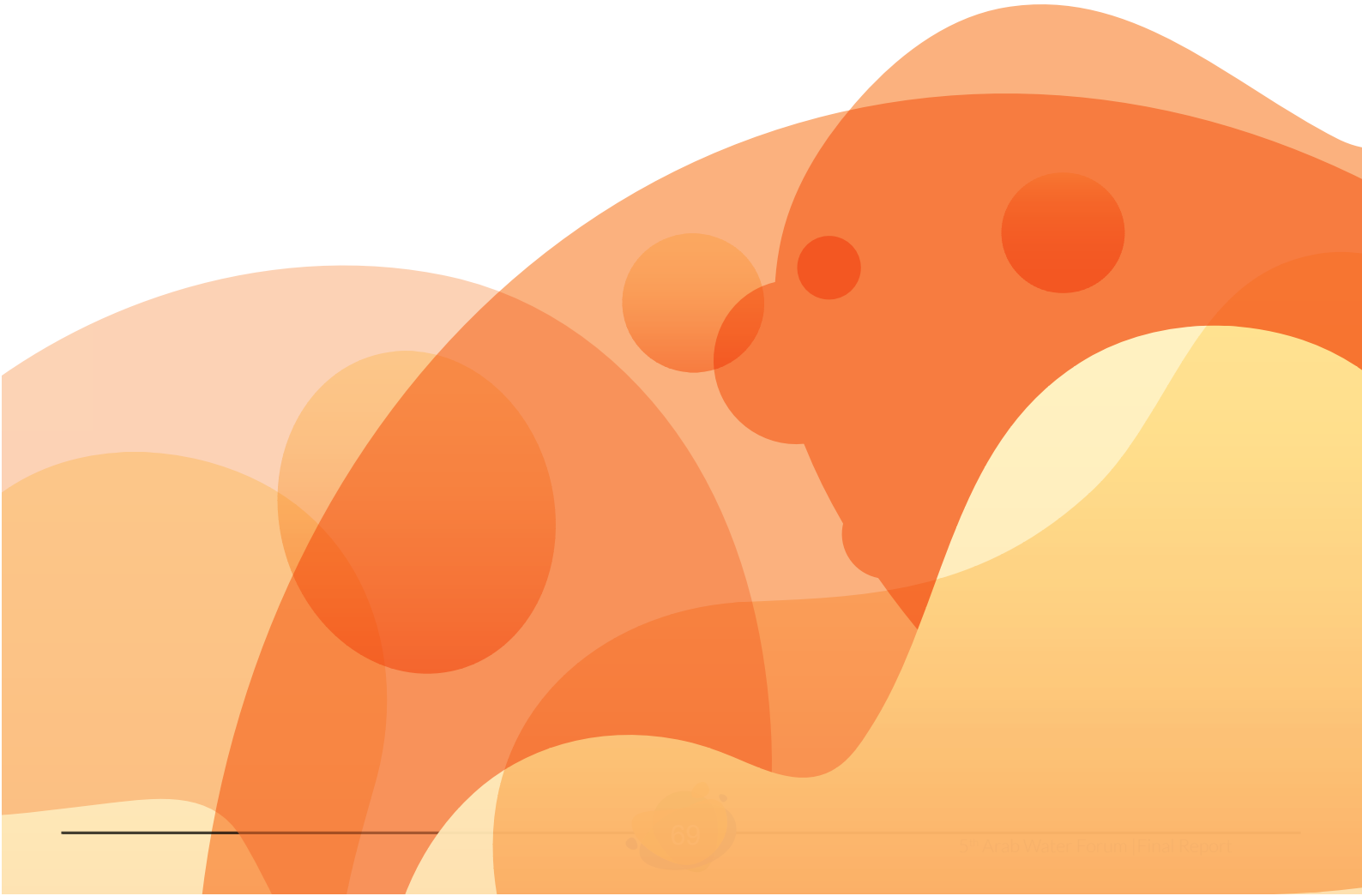
- Adapt to fit to purpose technologies
- Adopt a cost recovery plan with Research and Development
- Inclusive targeted awareness campaign (media, school curricula)
- Land application, waste to energy policy.
- Review, update , issue standards and guidelines
- Building trust through the early involvement of the end users
- Encouraging public private partnership (PPP)
- Development of procedure and guidelines/standards
- Develop a regulatory body with clear rules and responsibility

For Policy change

- Put in place a cost recovery plan and allocate budget for research and development
- Put in place a fit to purpose cost recovery plan
- Develop a mass media campaign
- Put in place an inter-ministerial committee
- Field visit to selected agriculture field with treated water to share experience
- Conduct regional workshops to facilitate the exchange of ideas
- Setup subsidies to support the cost of water treatment
- Define clearly the responsibility of each institution
- Inviting the private sector to participate via BOT arrangements and
- Allocation of lands from the government for irrigation with treated water
- Awareness raising for user about the consequences
- Increased monitoring efforts from state authorities

DAY 3

Thursday, 23rd September



Third Day Report **23 September 2021**

Theme of the Day: Water for sustainable Development.
Theme Rapporteur: Tina Jaskolski

An **Overview** of Day 3

The main focus of the third day was Theme 3 of the 5th Arab Water Forum, "Water for Sustainable Development". The day commenced with a plenary session which was followed by 4 panel sessions, one scientific session and one cross-cutting session.

The themed sessions were followed by two short plenary sessions. The first was an introduction and a cordial invitation to the upcoming 9th World Water Forum, which will take place in Dakar, Senegal, in March 2022. The second was about the way forward for the Arab Water Academy focusing on the importance of development of human capacity for Sustainable Water Resources Management.

This was followed by the announcement of the winners of Arab Water Prize Winners 2021, marking the important scientific achievements by winning researchers.

The day was culminated in a closing ceremony that included a summary of the findings and key messages of three days of lively presentations, discussions, and deliberations. The closing session offered thanks and appreciation to the organizers and hosts of the successful 5th Arab Water Form and closed with an anticipatory look towards the World Water Forum 2022 and the next Arab Water Forum.

The reports on the thematic sessions, their highlights, conclusions and key messages are listed below in the order they took place during the third day.

Plenary Session PL3

Session Title: Water for Sustainable Development

Conveners: AWC, ICARDA, SWA, IFAD, ESDF/RAED)

Session Officers

Moderators: Mr. Nasr Nasrallah and Prof. Walid Abderrahman

Rapporteur: Dr. Tina Jaskolski

Speakers:

Name	Affiliation
Dr. Mahmoud Abouzeid	Chairman of Arab Water Council
Her Excellency, Dr. Nada Elgizy	Ambassador, League of Arab States
Dr. Ali Abousabaa	CEO, ICARDA
Dr. Caterina De Abuquerque	CEO of Sanitation and Water for All (SAW)
Dr. Dina Saleh	International Fund for Agriculture Development (IFAD)
Dr. Emad Adly	NGO Civil Society

Session Highlights:

The Plenary session on the morning of the third day of the Arab Water Forum specifically addressed water in the context of sustainable development in the region. The session included a number of distinguished speakers with extensive international and regional experience in water resources management and sustainable development.

Main Issues Discussed:

As the plenary speakers noted, water is at the core of sustainable development and critical for ecosystems, humans, development, health, productivity. Moreover, water is at the heart of adaptation to climate change and thus represents an important link between climate, society and environment. In a water scarce region such as the Arab region, water can be a limiting factor to well-being and prosperity and even contribute to resource competition and conflict. Water security agenda

encompasses different uses of water, including drinking water, water for irrigation and agriculture, but also water for renewable energy generation, water in aquatic ecosystems, including marine environments.
Water scarcity, unequal water access and competition over resource access are interlinked with youth unemployment, a loss of livelihoods, migration, and gender-based violence. This means that policy responses to these issues need to be based on an understanding of the complex interlinkages between these issues, and tackle them through intersecting, multi-sectoral policy approaches and programs.
An integral part to shaping sustainable development in the region is recognizing and understanding the region's particular vulnerabilities in relation to water. Therefore, in this region even more than in others, sustainable management of water in the light of growing populations and economies is paramount to creating thriving, sustainable communities. It is also needed to realize that water can play an enabling role in building resilience in the face of unpredictable change.

In order to promote Sustainable Development environmental, social, and economic aspects of development have to be considered simultaneously. However, in order to achieve the Sustainable Development Goals by 2030, the region also needs to pursuing strong measures for economic and social development, as the Arab region houses many developing countries. The Sustainable Development Goals are strongly interlinked, and water runs across many of the SDGs, making sustainable water management an integral part of sustainable development.
The world and the region are currently not on track towards achieving SDG 6 by 2030 (Ensure Access to Water and Sanitation for All). As one speaker outlined, according to the Sanitation and Water for All, 21% of population in the region lacks access to safely managed water, 65% to safely managed sanitation. This concerns particularly people in rural areas, as 84% of people in rural areas have access to only rudimentary sanitation services. Session participants were reminded that water is a human right and that investments in water have shown to bring important benefits to health and well-being. The region is not only seeing an overuse of its scarce water resources, but a depletion rate that is progressing at an ever-faster pace in the context of growing populations and urbanization trends. Government responses to these regional processes remain weak,
The region is bracing for rising temperatures and sea levels, more variations in its regional climate, including changes in precipitation patterns and enhanced droughts, as well as ocean acidification and more saline soils and groundwater caused by sea water intrusion. As agriculture plays an important role in the region, agricultural production and food security will be strongly affected by the changing climate, affecting food security.

The water sector in Arab Region faces the underlying challenge to achieve more with less. This sentence goes beyond the immediate context of agriculture and includes boosting development and ensuring public services to thriving communities, enabling viable and sustainable livelihoods across different sectors despite chronic water scarcity, increasing water demands, massive influx of refugees, a lack of access

to safe water and sanitation services, ageing infrastructure, a lack of information systems, weak institutions and strained financial resources. Climate change and climatic extremes add another risk factor to this equation.

Recommendations:

- To leapfrog water sustainability in the region, the speakers made a number of recommendations to achieve more transformational change and to improve the region's achievement on the trajectory towards implementing the SDGs:
- Policy and planning approaches on water and sustainable development should be built on the "5-Is":
  - I for integration – away from silos, inclusive
  - I for innovation through new technologies, financing, partnerships
  - I for infrastructure (resilient and green, not gray)
  - I for information – data necessary to make policy-decisions
  - I for institutional reform
- In order to make these transformations on multiple levels, awareness and capacities have to be built on multiple levels and across multiple stakeholders, including policy makers, planners and government staff that implements policies, as well as civil society, farmers, the private sector and academia. Regional cooperation and new partnerships can help strengthen these efforts
- It is needed to develop more integrated approach and holistic perspective on achieving sustainable water management in the region, enhancing our understanding of the interlinked components (hydrological, environmental, economic, demographic, socio-cultural and institutional dimensions) of water in sustainable development
- There are needs of better data and more joint research and knowledge management in the region on the complexities of water and sustainable development, including international hydrological research programs, to build a better understanding of water across the different SDGs.
- Such data needs to be translated into regional monitoring and reporting processes of water-related SDGs challenges and measures with enhanced indicators that can capture and measure the complexity of the interrelationships between different SDGs.
- Research is showing exciting innovations and solutions – these need to be trialed, expanded, implemented and scaled up. In this process, it becomes important to make such technological innovations economically viable, affordable, marketable, and replicable.
- To boost exciting new technologies, research, and collaboration in the region, creative financing mechanisms (such as the green climate bonds in Egypt) are needed.
- There should be more participatory ways of planning, decision-making and implementation in the region. In this process, NGOs need to recognized as key

players in shaping the path forward and need to be more actively involved in the implementation of sustainability projects on the ground. Moreover, the role of young people needs to be elevated in this process and young people need to be engage and integrated through key roles in decision-making. They are often very successful at mobilizing communities.

- We need to force new types of collaborations and partnerships among different types of organizations in a more cross-cutting manner. This includes partnership among civil society, the private sector, government institutions, and academia that are inclusive of key groups that are often marginalized, such as youth, NGOs, women, and indigenous groups. The impact of such partnerships should be assessed.
- There needs to be a fundamental transformation of water management and food production systems based on innovative technologies and a change in practices, e.g. moving towards integrated farming and more diversified food production systems and away from mono-cropping in order to create more sustainable, resilience livelihoods and to enhance nutrition, health, and well-being.
- Support and social protection systems need to be tailored to the needs of the most vulnerable parts of the population, for example small farmers.

Main Conclusion and Recommendations:

- There needs to be significant improvement of our regional efforts to conserve and protect water resources, to manage water in a sustainable way, and to leverage existing efforts to achieve the Sustainable Development Goals by 2030 – in this context of SDG the region needs to quadruple its existing efforts.
- While immediate sustainable water management action is needed in this region that faces extraordinary water scarcity and a number of other compounding risks and challenges, there are also important achievements that should be celebrated, for example in the sector of technology innovation and innovative funding and financing mechanisms. To accelerate results, such innovations need to be successfully scaled up.
- More regional cooperation in upscaling technological innovations, as well as in research, data collection, data sharing, knowledge management and reporting could advance positive results on regional sustainable water management. More regional cooperation on the sharing and sustainable management of transboundary resources is another matter of prime regional concern.
- In order to achieve SDG 6 and other related SDGs, unprecedented transformations of water management and food production systems are necessary. This includes more efficient water management practices, a better reuse of water, and the sustainable exploration of diverse water resources. These deep-reaching transformations go along with a need to re-imagine, re-organize, and re-structure policy design, planning, implementation and institutional organization towards more integrated, multi-sectoral, and cross-cutting approaches. Such institutional restructuring should also reconsider water prices, subsidies, taxes,

and incentives. As it has been repeatedly highlighted, business as usual is no longer a viable option under mounting regional pressures.

- There are regional and international bodies that are already advancing the sustainable water management agenda across the Arab Region, including the League of Arab States, the Arab Water Council, and various institutions of the United Nations. The League of Arab States is already initiating and facilitating regional cooperation on climate and water security, and this role could be further expanded. This includes regional reporting on SDGs achievements, particularly in conflict-affected countries (for example in reporting to international institutions such as ESCWA).
- Regional platforms such as the SDG-Climate Facility work to further enhance regional achievements in the implementation of the Sustainable Development Goals.
- Regional efforts and cooperation should highlight the importance of water as a key to security, safety, and peace in the region.

Panel Session: P3-PS1

Session Title: Accelerating Action on IWRM for Sustainable Development through the Water Action Decade

Organizers: ESCWA, LAS, AWC, ACSAD, UNEP/DHI, CEDARE, FAO

Session Officers

Moderator: H.E. Mr. Hussein Al-Atfy (AWC); Mr. Hammou Laamrani (LAS)
Rapporteur: Ms. Joelle Comair (ESCWA)

The session's objective is to discuss progress in achieving integrated water resource management (IWRM) in support of the Water Action Decade objectives and solicit inputs from participants to support the Arab regional preparatory process for the Midterm Comprehensive Review of the Decade.

Speakers:

Name	Organization
Mr. Hammou Laamrani	League of Arab States
Mr. Ziad Khayat	ESCWA
Mr. Ihab Jnad	ACSAD

Mr. Paul Glennie	UNEP-DHI
Mr. Ahmed Legrouri	ESCWA Expert
Ms. Joelle Comair	ESCWA
Mr. Ragab Abdelazim	Ministry of Irrigation and Water Resources, Egypt

Panelists:

Name	**Organization**
H.E. Mr. Hussein Al-Atfy	Arab Water Council
Mr. Ragab Abdelazim	Ministry of Irrigation and Water Resources, Egypt
Mr. Khaled Abu Zeid	CEDARE
Mr. Waleed Abouelhassan	FAO
Mr. Iyad Rammal	The World Bank

Topics Presented:

The discussions during the session highlighted the following points:

- The United Nations General Assembly proclaimed the period from 2018 to 2028 the International Decade for Action on Water for Sustainable Development (Water Action Decade). The Decade seeks to increase focus on integrated water resource management (IWRM) for sustainable development and to strengthen cooperation, partnerships and capacity development in water-related goals and targets, including those in the 2030 Agenda for Sustainable Development.
- The Water Action Decade has been well-received by Arab States given the centrality that freshwater scarcity and water security play in advancing sustainable development in the region. This is demonstrated by resolutions and recommendations adopted by Arab States in intergovernmental and regional forums, including those by the Arab Ministerial Water Council, the ESCWA Committee on Water Resources and regional consultations on water.
- Based on regional consultations coordinated by ESCWA, a collaborative roadmap for Arab regional preparations leading to the United Nations Conference for the Midterm Comprehensive Review of the Water Action Decade is ongoing. This involves engaging regional stakeholders, implementing activities that explicitly support the Decade in the region, and preparing the regional contribution to the midterm comprehensive review report based on progress achieved, lessons learned, and challenges affecting the achievement of water-related SDGs in the region.
- The Arab roadmap will be regularly updated to reflect regional engagements throughout this process. Short policy briefs (1-3 pages) with key policy messages generated from regional contributions to the WAD (events, sessions and publications outputs) will be prepared to inform the preparation of the Arab regional preparatory meeting (May 2022) and regional report.
- The Strategy for Water Security in the Arab Region to Meet the Challenges and Future Needs for Sustainable Development 2010-2030 was approved by the Arab

Ministerial Water Council in 2010, and its action plan was issued later in 2012. The strategy primarily aims at achieving sustainable development that responds to future requirements and represents a guiding document for joint Arab actions that shall be reviewed every five years according to precise, measureable and monitorable performance indicators.

- The Arab Center for the Studies of Arid Zones and Dry lands (ACSAD) follows up the implementation of the strategy's Action Plan in cooperation with all partners of the AMWC, and in 2018, was requested by the AMWC to conduct an update of the strategy in light of recent regional and global water developments. Accordingly, the updated strategy was approved in 2019 by the Technical Scientific Advisory Committee of the AMWC and sent for review to Arab countries. It includes additional themes such as Water Accounting, water governance, the water-energy-food nexus, Covid-19 and its impact on the water sector, as well as monitoring and evaluation.
- IWRM is essential for alleviating the impacts of increasing freshwater scarcity in the Arab region, including on groundwater and shared water resources.
- Regional analysis of SDG indicator 6.5.1 indicates that between 2017 and 2020, the regional average IWRM implementation increased from 48 to 53 percent (similar to the global increase from 49 to 54 percent); however, the rate of implementation needs to double in order to reach the global target.
- Real and rapid progress on IWRM implementation is possible as between 2017 and 2020, 6 countries made substantial progress or are close to achieve the target and 5 countries made moderate progress, although 9 countries made limited or no progress.
- Many countries in the region need to strengthen the enabling environment for IWRM through policies, laws and plans. When comparing the seven-enabling environment elements for implementation, progress is lowest for instituting transboundary management arrangements despite the dependency of most Arab States on transboundary surface or ground water resources.
- Financing for water resources management exhibits the lowest score of the four IWRM dimensions. This score indicates that financing for water is not given sufficient attention, despite IWRM implementation success being tightly linked to the budgeting and financing made available for water resources development and management.
- Data availability is key to advance progress on IWRM and all stakeholders are invited to collaborate in this regard in a effective and transparent way, namely governmental institutions, civil society, academia, and the private sector.

Main Conclusions and Recommendations:

- Wide disparities exist between countries in the region and between countries within the same sub-region in establishing institutions and engaging stakeholders for IWRM implementation. Many countries in the region need to strengthen the enabling environment for IWRM through policies, laws and plans.

- Opportunities exist for increasing financing for water projects when objectives are twinned with other development objectives related to health, human rights, food security and climate resilience.
- To advance progress on SDG 6.5.1, crucially needs coherent governance within and across sectors, improving availability and access to data and information, leveraging innovation and technologies, unleashing female and youth potential and improving transboundary cooperation.
- Data availability and data sharing is key to advance progress on IWRM and all stakeholders are invited to collaborate in this regard in a effective and transparent way, namely governmental institutions, civil society, academia, and the private sector.
- Arab countries and regional stakeholders are invited to actively engage in this process of Midterm Comprehensive Review of the Water Action Decade through implementing activities that explicitly support the Decade in the region, and voice regional water-related priorities, progress achieved, lessons learned, and challenges affecting the achievement of water-related SDGs in the region.
- Key policy messages generated from the 5th Arab Water Forum will be prepared to inform the preparation of the Arab regional preparatory meeting and regional report to the Midterm Comprehensive Review of the Water Action Decade.

Panel Session P3-PS2

Session Title: Leveraging The Untapped Potential of Food Production Under Water Scarcity and Climate Change in The Arab Region

ICARDA
Science for resilient livelihoods in dry areas

ICID•CIID

Food and Agriculture Organization of the United Nations

Organizers: FAO / IWMI

Session Officers

Moderators: Vinay Nangia, (ICARDA) and Pasquale Steduto, (FAO)
Rapporteur: Domitille Vallée, (FAO) and Dr. Kamel Amer (AOAD)

The session explored the challenges the Arab region faces in reconciling growing water scarcity, the need for increased water productivity, and ensuring food security.

Keynote Speakers:

Name	Organization	Title of Presentation
Aly Abousabaa	ICARDA Director General	Addressing Climate Change Risks on Water and Food Security in the Arab Region
Ragab Ragab	ICID President	Food Security under Changing Climate and Water Scarcity
Amos Winter	Tata Chair Professor, Director GEAR Lab, MIT	Global by Design: Creating Technologies for Developing and Emerging Markets

Panelists:

Name	Organization
Pasquale Steduto	FAO
Charafat Afailal	Former Moroccan Water Resources Minister
Essa Alhashmi	Head at the Food Security Office in the Prime Minister's Office, Government of UAE
Felix Reinders	WASAG Chair
Xurong Mei	Vice President, Chinese Academy of Agricultural Sciences
Atsushi Tsunekawa	Professor, Tottori University, Japan
Ayman Omer	In-charge of Resilience Program, FAO RNE
Khalil Ammar	Head of Natural Resources Management Program, ICBA

Topics Presented

The session speakers assessed both emerging opportunities and transformation needed, including the exposure to global transformative innovations in the field of dryland agriculture water management and increasing awareness of the opportunities to leverage untapped potential for food production in the Arab region.

The keynote speaker, Dr Abousabaa emphasized the challenges of farming among intensifying climate change. Climate change impacts are widespread, rapid and intensifying (see box), including increased humidity, lower groundwater, sea level rise, advancing salinization and ocean acidification. In the light of climate change, it is even more essential to manage our water better. Moreover, in our future food production systems for growing populations, one farmer will have to feed 265 people. There is a need to look towards technological innovation, climate smart agriculture, digital readiness, mobile technology. The region needs to work on integrated desert (family) farming systems with horticulture and date palm production, scaling down as well as scaling up. We also need more reliable data and models, as well as more accurate, local and field-level information. There are promising examples for unconventional solutions, including the NENA ET regional network, dry farming, payment for service for nature, the One CGIAR excellence agronomy initiative and diversified irrigation systems.

Dr Ragab Ragab referred to the increase in global food demand, and population increase is expected to reduce the water availability per capita by one third by 2050. Urban populations are increasing, diets changing, demand for out-of-season crops rising, and food production is competing with biofuels. The result is clear: there is a need to more crop per drop of water, per kilowatt of energy, and per land area. Towards this end, reusing and recycling limited water resources and nutrients, protecting productive lands, recharging groundwater aquifers, electric cloud seeding, and increasing water use efficiency at all levels are important steps. Further, the use of solar energy in agriculture should be promoted, water harvesting both on the surface or underground enhanced using circular bunds, and underground dams. The use of non-conventional water to grow vegetables should be advanced, while

using treated waste water from agro-industry to irrigate cereal or for aquaculture. The decentralization of water treatment as smaller-scale, domestic water treatment is the future. Another necessity is the use non-conventional salt tolerant crops and the improvement of field management to conserve the water. Types of farming that can co-exist with wildlife are needed to protect biodiversity.

Dr Amos Winter introduced innovative technology that is being locally tested to improve agriculture and water in water-stressed areas in the region. The project is focused on creating technologies for emerging markets in developing countries by designing high performance, low cost technologies tailored to local needs. Again, here, technical solutions may have to be downscaled first so that they can then be scaled-up. One example is cutting the costs of community-scale desalination systems by using electrodialysis (ED) which uses only 20% of the water, with brackish water instead of RO. .Another example is to lower the cost of reducing non-conventional irrigation through low power drip emitters (low pressure emitter to reduce pump and power system costs tested in Jordan and Morocco). The solutions showed a reduction in average pumping energy by 43% and also lower capital cost and can be further enhanced in the future by combining the two solutions, solar powered desalination and low-pressure drip irrigation.

The panelists confirmed that water scarcity and climate change are the most pressing challenges in the Arab region. They also added that water is water is key to food security and plays a vital role at all stages. There is a collective responsibility to ensure that water supports food security while ensuring sustainability. This requires an interdisciplinary approach and cooperation with private sector, civil society and government to learn together. A range of solutions to explore are: improving operation and management of irrigation system, implementing water saving techniques, and encouraging participatory management. The co-development of solutions that go beyond academia and involve farmers, government etc. and the implementation of transdisciplinary research to adapted solutions to local contexts should be promoted.

Addressing water and climate change together requires considering critical dimensions: transboundary water and its governance dimension, collective responsibility; integrating hazards – extreme cold or heat waves, transboundary pests and diseases, structural challenge of the region with the economic process, managing at the same time multiple risks. This requires an interconnected way that takes a nexus approach to consider water scarcity and build on coordination and cooperation, for example cooperation between different sectors, ministries and sectors led by LAS (water and agriculture). There is also a need to look at the investment needed to facilitate this holistic approach and cooperation.

Many technologies related to saline agriculture and salt/ heat tolerant crops exist and can be upscaled. Specialized centers like ICBA can provide guidance on the best option for a given condition. Also build on work on data driven agriculture with artificial intelligence, machine learning, remote sensing to develop more precise agriculture production system, soil amendment, drought monitoring tools.

New Ideas and Innovations

- Developing innovative technologies for local needs, making them affordable and replicable
- Using of innovative, community-based technical solutions (including solar desalination and drip irrigation)
- Exploring unconventional water sources, including brackish water and wastewater
- Co-management of shared resources, through a process that bring all stakeholders on board to analyze the situation (technical study on the aquifer), agree on monitoring tools, and engage a follow up committee and raise awareness of the population (e.g. the aquifer contracts used in Morocco).
- Sharing the many advanced solutions exist in the UAE on technical readiness level to evaluate the food strategy: green houses, protein culture, aquaculture recirculating systems, transforming the animal feeding systems, or using sensors and artificial intelligence to manage poultry.

Main Conclusions and Recommendations:

- The Arab region can bridge the gap of food production for food security by simultaneously working on making water resources available (e.g., reuse, desalination and water harvesting), working on agronomy (more crop per drop) and efficiency (more crop per kilowatt and per land), and implementing demand management measures, with adaptive approach putting in place innovative solutions (research and technology)
- There are existing technical, economic and governance tools and innovations tested and operational related to water/irrigation technologies, crops (conventional and non-conventional), the use of artificial intelligence and remote sensing. Innovation/research and science are key to leveraging the untapped potential of food production under water scarcity and climate change, but this needs to be done using a co-development approach engaging multi-stakeholders through transdisciplinary work built on a sound understanding of local cultures and conditions as well as a sound understanding of local water situations (water accounting)
- Increasing awareness of the various dimensions of the problems – transboundary, hazards from climate change or extreme events, water scarcity- will increase the opportunity to be exposed to transformative innovation.
- Non-conventional water resources, salt and drought tolerant crops represent important opportunities in the region, and there are available and tested technologies and know-how to enhance their usefulness and limit the negative impacts. They can play a key role in food production.
- Social engineering is also part of the solution, building awareness and co-developing sustainable approaches for managing groundwater as illustrated by the groundwater aquifer contracts in Morocco.
- Cooperation and coordination from local to regional level (inter country) can

support a faster renewal of governance arrangements, knowledge exchanges and policy support, as illustrated with the League of Arab States' High-Level Committee on Water and Agriculture and through the various efforts of transboundary cooperation on water, crops, and managing spreading of diseases.

- It is important to review the knowledge accumulated on the range of options available for combined approach for water resources and demand management, for crop and agronomic improvement to achieve food security in a growing water scarcity and climate.
- Regional cooperation and coordination play a key role in ensuring that the needed research, knowledge, innovation and practical experience is shared across the regions, is adapted if required and used for upscaling effective efforts.
- Strategies need to be cross–sectoral and transdisciplinary to include water, agriculture, health, energy, climate change among some of the topics to integrate.
- Technical innovations and farming systems need to be tailored to local needs and affordable to local farmers, therefore a down-scaling of technology and integrated systems may be necessary before an up-scaling can occur.

Panel Session P3-PS3

Session Title: Regional Water Accounting and Auditing

Food and Agriculture Organization of the United Nations

IWMI International Water Management Institute

Organizers: FAO / IWMI

Session Officers

Moderators: Marwa Ali

Rapporteur: Adham Badawy and Tina Jaskolski

The session focused on the importance of water auditing and accounting in water management, reviewing important lessons learnt from the application of these tools across the region.

Keynote Speaker:

Name	Organization	Title of Presentation
Amgad ElMahdi	IWMI	Regional Lessons Learnt of Water Auditing

Other Speakers:

Name	Organization	Title of Presentation
Domitille Vallee	FAO	WEPS-NENA Project Brief
Adham Badawy	IWMI	Water Auditing Approach and Concepts
Mona Fakih	MEW	WGA Lessons Learnt from Lebanon
Adel Abiedat	MWI	WGA Lessons Learnt from Jordan

Panelists:

Name	Organization
Domitille Vallee	FAO
Nafn Amdar	IWMI
Mona Fakih	MEW
Jihad Saleh	MWI

Topics Presented:

Water accounting and water auditing are extremely valuable tools for understanding the key water management issues and can allow through a systematic approach reach to the most appropriate priority of actions and interventions that address those issues.

In both Lebanon and Jordan, many challenges were faced in conducting Water Governance Analysis (WGA), most importantly are difficulties in getting stakeholders engagement and also different Perspectives and interests (inside water institutions and outside). Financial stability and information availability are both limiting factors and constraints for implementing water auditing and getting deeper levels of analysis.

Session presenters emphasized that WGA needed to be embedded within a framework that is compatible with pre-existing values, social structures and processes in place. In this context it is importance to note that governance is a concept that reaches beyond government, and that in considering the appropriate scale of intervention it becomes necessary to think beyond government. Moreover, defining water as an economic and public good requires support to establish independent regulators.

In the context of water auditing and accounting, enhanced capacity is needed to consider economic, financial, social, environmental and political issues in a transparent manner.

New Ideas and Innovations:

Water Accounting is an innovative approach for understanding the key trends in water uses and sources and monitoring every drop of water. Water Auditing (Water Governance Analysis), as a complementary approach to water accounting, has the potential to put those trends into the context of the political, socio-economic and legal factors that shape how water is governed.

Main Conclusions and Recommendations

- Water scarcity, a common driver for a multiplicity of issues across the region, needs to be better understood in a comprehensive context.
- Water Auditing (Water Governance Analysis) is complementary with Water Accounting, and both should be carried in an iterative process to improve and refine these tools in order to gain a deeper understanding of the problems and select the most appropriate interventions.

- A regional shift is required to understand the value of water accounting and water governance and their complementarity.
- National governments are willing to adopt and implement water accounting units and undergo water auditing to support their decision making
- Determining appropriate action comes from understanding both the externally imposed nature of some governance reforms and their limitations.
- There needs to be a better understanding of the receptiveness to market-based or institutional innovation.
- A key challenge that remains in governance is to establish institutional designs and then to link them to management structures (from community through and to international river basin levels).

Panel Session P3-PS4

Session Title: Humanitarian and Development Support for Water and Sanitation Providers in MENA

Organizers: ICRC, UNICEF, World Bank

Session Officers

Moderator: Clare Dalton

Rapporteur: Nesma Nowar and Tarek El-Samman

The main objective of the session is to present the findings of recent collaborative work by the World Bank, UNICEF, and ICRC to publish a new report today called, "Joining Forces to Combat Protracted Crises: Humanitarian and Development Support for Water and Sanitation Providers in the Middle East and North Africa." The report is based on case studies from humanitarian and development actors as well as local partners in seven contexts in the Middle East and North Africa.

Keynote Speaker

Name	Organization	Title of Presentation
Iyad Rammal	World Bank	Joining Forces: How Humanitarian & Development Actors Can Support WSS Service Providers to Deal with Protracted Crises

Panelists

Name	Organization
Chris Cormency	UNICEF
Igor Malgrati	ICRC
Ali Abdul-Sattar	GIS Department, Directorate of Water in Ninawa, Iraq
Rafeeq Mahmoud Abuilsayyin	General Company of Water and Wastewater, Libya
Rizk Rizk	Bekaa Water Establishment, Lebanon

Topics Presented

The protracted nature of many conflicts in today's world has put enormous pressure on essential services such as water supply, sanitation, health and electricity systems. Urban contexts pose unique challenges with respect to the protection of civilians and have humanitarian consequences that go far beyond the visible signs of destruction. Ensuring access to a safe supply of water and adequate sanitation in urban areas remains a challenge for many utilities in the MENA region that are managing through protracted crises.

The report it seeks to improve the humanitarian response, while collectively upscaling the impact. The report unpacks the tangible benefits of the Humanitarian-Development Nexus to deliver a more sustainable humanitarian impact, while reinforcing the emergency response.

- Protracted crises in urban contexts of the MENA region present a growing challenge for water supply and sanitation (WSS) service providers and, in turn, the governments and international organizations that support them.
- There are five pernicious problems identified by WSS service providers operating in protracted crisis in the MENA region: (1) inadequately governed water resources management; (2) aggressive competition from alternative providers, undermining network services; (3) paralysis of high-tech wastewater treatment plants; (4) escalating energy costs of off-grid generation; and (5) the cashflow crunch as service provider costs jump and revenues fall.
- WSS service providers struggle to stem the rate of service decline without substantial external support from both humanitarian and development actors.
- New types of partnerships between humanitarian and development actors are needed to identify approaches to help WSS service providers build greater resilience into services both prior to and during protracted crisis.

New Ideas and Innovations:

- Crisis layered on top of development challenges as WSS service providers' new challenges are added on the old challenges and both needs to be addressed during crisis.
- First objective in responding to protracted crisis is to stem the decline in service delivery and this could happen with close cooperation and coordination between all involved parties, including the WSS service provider, the government, the humanitarian actors and development actors. Development actors should be involved and provide support during the humanitarian needs phase.
- The cumulative effects of both direct and indirect impacts on water and sanitation services may end up being a greater threat to children and young people than the conflict itself (i.e. cholera outbreak in Yemen).
- Sustainable WSS utilities (i.e. improve cost recovery by embracing proactive customer management, ring-fencing service providers' finances, and moving

toward corporatization is important) would be more resilient to crisis.

- Accounting information can provide early warning signals that intervention is needed to strengthen the service providers to be more resilient to crisis.

Main Conclusions and Recommendations:

- Development actors need to place greater emphasis on building the resilience of WSS service providers pre-crisis and during protracted crisis wherever possible. A major driver of decline in services during protracted crisis has been the lack of attention paid by development partners to resilience building prior to crisis.
- Humanitarian actors, in addition to their core emergency response role, should be encouraged to further build their capabilities to support the business continuity of WSS service providers.
- Humanitarian and development actors can strengthen their partnerships in both anticipating and responding through:
- Working together with WSS service providers to make emergency preparedness plans for acute crises—as a "no-regrets" investment.
- Pre-crisis partnerships would enable humanitarian actors to: (I) establish links with WSS service providers and their supporting ministries; and (II) share knowledge of pre-crisis service delivery constraints.
- In protracted crisis, it should be a standard, internationally agreed requirement for humanitarian and development actors to coordinate and align their interventions to support resilience building of WSS service providers.
- Both pre-crisis and during protracted crisis, humanitarian and development actors should work in a complementary and coordinated manner with WSS service providers on improving financial transparency to unmask underlying vulnerabilities.
- A strong partnership needs to be forged between humanitarian organizations, development actors, and local service providers (i.e. Joining Forces) to work towards strengthening the resilience of essential services before and during protracted crises without compromising humanitarian principles.
- The general findings and recommendations of the report hold relevance well beyond the WASH sector and the MENA region.
- Strengthening the partnership that can be had between humanitarian and development actors can take on many different forms, for instance knowledge and expertise exchange, operational collaboration, humanitarian diplomatic engagement (influencing), as well as the potential for humanitarian actors to acquire funding.

Scientific Session P3-SS1

Session Title: Water for Sustainable Development

Convener: Arab Water Council

Session Officers

Moderator: Prof. Dr. Shaden Abdel Gawad, former President of National Water Research Center

Rapporteur: Dr. Amel Azab, Arab Water Council

The objective of the session is to provide a platform to researchers to share the findings of their recent work related to the theme of water for sustainable development.

Speakers:

Name	Organization	Title of Presentation
Samer Muhandes	Barnaby Dobson and Ana Mijic, UK	A Method for Adjusting Design Storm Peakedness to Reduce Bias in Hydraulic Simulations
Mohammed Ahmed El-Shirbeny	ICARDA	Arab Country Maps of the ET and Vegetation Cover Classifications
Hala Alhamed	International Expert Water Management, CEO, Netherlands	Multi-Criteria Decision Analysis for Data Needs Assessment in Water Utilities
Dr. Luay J. Froukh	Jordan Waste Water & Solid Waste Reuse Organization	Wastewater Reuse for Water and Livelihood Security in Rural Areas
Olfa Gharsallah	Università Degli Studi di Milano	Towards a Sustainable Water Use in Mediterranean Rice-Based Agro-Rcosystems: MEDWATERICE

Topics Presented:

In the session, five presenters gave an overview of their research papers submitted to the 5th Arab Water Forum's scientific committee.

The first presenter Dr. Samer, gave a presentation on the developed method for Adjusting Design Storm Peakedness to reduce bias in Hydraulic Simulations, the presentation showed that peakedness of the climate change has its effects on hydraulic modelling results and a Novel Method to modify the design storms was developed to get more reliable results from the models.

The second presenter Dr. Elshirbiny presented the results of a research study focusing on the development of Maps of the Evapotranspiration and vegetation coverage classification in the Arab region. The study results showed mapping categories of vegetation density, reference evapotranspiration and crop evapotranspiration and rain fall from the year 2005 to 2020.

The third presenter Dr. Hala gave an overview of a developed Multi-Criteria Decision Analysis for Data Needs Assessment in Water Utilities. The presentation covered the need for the study to address the reliable water services, evidence-based decisions, reliable and accurate data, and what data needs to be collected for specific objectives, based on cost effectiveness and multicriteria decision analysis. The researcher highlighted the importance of connection between decision makers and operational level when designing data collection and analysis systems, and emphasized the importance of sharing uncertainty in data for decision making.
The fourth presentation by Dr. Luai covered an important topic on the Wastewater Reuse for Water and Livelihood Security in Rural Areas where a success story from a project in Jordan. The presenter showed a model of supporting local rural communities with irrigation reused wastewater for agriculture and for raising income and becoming self-dependent communities.

The fifth presenter Ms Olfa gave an overview of a research project results on: Towards a sustainable water use in Mediterranean rice-based agro-ecosystems. The MEDWATERICE, is a regional joint project with seven case studies from seven partner countries.

New Ideas and Innovations:

- A novel method to modify the design storms based on peakedness to get more reliable results from the hydrological models.
- Supporting local rural communities with irrigation reused wastewater for agriculture and for raising income and becoming self-dependent communities

Main Conclusions and Recommendations:

- Hydraulic modelling should influence decision making
- Importance of connection between decision makers and operational level when designing data collection and analysis system using expert judgment methods.
- The importance of the representation of uncertainty in data for decision making.
- Using reused waste water as a main water resources for supporting water for agriculture and livelihood security in local rural communities.

Cross-Cutting Session: P3-CC1

Research & Innovation for Youth Engagement in MENA's Water Sector.

Organizers: CIHEAM Bari, Arab Water Council

Session Officers

Moderator: Dr Roula Khadra CIHEAM Bari International Officer and AWC Board of Governors.

Rapporteur: Yasmine Seghirate and Mona Elagizy

Speakers:

Name	Organization	Title of Presentation
H.E. Hussein El Atfy	AWC	Introduction
Mrs Yasmine Seghirate El Guerrab (In charge of reading the presentation of M. Placido Plaza,)	CIHEAM	**M. Placido Plaza**, Secretary General of the CIHEAM, International Centre for Advanced Mediterranean Agronomic Studies **Mrs. Yasmine Seghirate El Guerrab** Head of department - Project manager at CIHEAM Secretiat General, Gender Equality & Youth Inclusion Focal Point

Panelists:

Name	Organization	Title of Presentation
M. Ahmed Ali Ayoub	CIHEAM Bari	IoT and Automation for precision agriculture: a perspective of sustainability
M. Bilal Derardja	CIHEAM BARI	Artificial intelligence for pressurized irrigation systems performance assessment: towards better management
Mrs Yarah El Nagdi	AWC,	Youth Programs

Topics Presented

One of the biggest challenges that MENA currently faces is the water crisis and achieving the Sustainable Development Goals by 2030. The situation is worsened by the social-economic impacts of the COVID-19 crisis. Failing to address such challenges will impact the region's social and political stability, not merely its welfare

and wellbeing. Towards a sustainable development approach that is nationally and regionally coordinated, it is fundamental to integrate youth and women, especially in rural and agricultural areas and vulnerable communities. Young people and women represent the categories of the population most affected by poverty, unemployment and discrimination. The unemployment rate for young people and women in the MENA region is one of the highest in the world. Yet, a large part of the unemployed youth are also graduates. This is a sign of a mismatch between the teaching environment, the demands of the constantly changing market of work and public initiatives developed in terms of professional integration and job creation.

Over a third of the 169 SDG targets highlights the role of young people and the importance of their empowerment, participation and well-being. Twenty targets across six SDGs are strongly focused on youth: Zero Hunger, Quality Education, Gender Equality, Decent Work and Economic Growth, Reduced Inequalities and Climate Action. The demography of the MENA region and the high percentage of youth among the populations of MENA countries (almost 60% of the region's population are under 30 years of age) are forces and opportunities to be seized, both to strengthen food security and to anchor sustainable development practices in policy-making, planning, implementation and behavior.

With the large numbers of youth engaged in different online platforms, young people are able to draw worldwide attention and help organize the agendas they value. They are also keen and eager to contribute to the resilience of their communities through community participation and engagement, developing and proposing innovative solutions, as well as inspiring social enhancement and community development.

Surrounded by those challenges and opportunities, the conveners of the session tried to investigate the obstacles that hinder youth engagement and how to overcome them, furthermore they seized the opportunity to pave the way for better communication flow channels among the youth through young water professional's networks.

New Ideas and Innovations:

- The powerful regional actors and events similar to the 5th Arab Water Forum create conditions favorable for dialogue and collaboration, in particular through the establishment of public-private platforms bringing together public authorities, NGOs, companies, financial, training and research players wishing to contribute to strengthening the position of young people and women. These platforms could act in favor of a better match between education and training offers to better meet the needs of companies, the demands of the labor market, and to optimize public initiatives contributing to job creation by rural and agricultural environment.

- To sustain initiatives with young people and for young people, it is important that the actors of cooperation and research adopt a formalized youth policy, with the objective of making the inclusion of young people as axis of transversal improvement. They must be able to have indicators and assess the progress made.
- Socially appropriate smart farming technologies and digital innovations such as (mobile apps, MOOCs and other innovative online education technology platforms) could play an essential role in rural communities by empowering women, enhancing rural resilience, and providing climate security.
- CIHEAM Bari showed some of the potential technological solutions such as low cost IoT sensors for precision agriculture and machine learning algorithms for facilitating challenging computational simulations.

Main Conclusions and Recommendations:

- For enhancing youth engagement, it is crucial to create more opportunities, jobs and channels for them to express themselves, convey their ideas and provide their inputs for projects, policies and programs. This could guarantee through venues such as national strategies and Arab/Mediterranean regional cooperation which target youth empowerment.
- More investments in capacity building programs, technical trainings and educational scholarships in the water sector are needed taking into consideration humanities and social sciences as an essential educational specialty when discussing water management in social, cultural, economic and political contexts.
- Promoting regional educational and mobility programs and regional scientific research is an important milestone in the regional integration path – not just from the technical point of view, but also for fostering cooperation among Arab youth and with their peers at Mediterranean and global scales which could significantly develop a new state of mind when addressing regional challenges such as water scarcity and water security to come up with regional solutions - and more importantly - have the capacity and the will to implement them.
- CIHEAM Bari represents a role model on how capacity building and regional education programs could bridge the gaps in the region and bring its youth together to learn about and discuss mutual challenges and possible solutions. Similar efforts have to be supported.
- One of the main obstacles that hinders regional integration and development in general at all levels (regional, national and local) is data availability and transformation. Such challenge has two main layers preventing any breakthrough: i) Institutional challenge represented in the legislation and bureaucracy and ii) Technical challenge represented in the tools, platforms and capacity building. The conveners recommended strengthening data sharing protocols and providing regional tools necessary for regional scientific research such as data acquisition platforms and regional capacity building programs to form mutual consensus of the challenges and solutions.

- Through investment in education and research in the region's youth, regional developing path had to be invested, not just with the aim of sharing knowledge and equipping youth with the era skills but also to develop a regional perspective and to consider social adoption aspects when putting those skills into action. Such challenge could only be faced by the region's youth through investing in similar educational programs. Thus, the conveners recommend organizing national and regional awards and providing funding channels to foster such initiatives.
- The panel members also recommended the simplification of administrative procedures and the establishment of one-stop shops for young people who wish to engage in a professional or associative activity participating in food and water security, sustainable agriculture and fisheries.
- The private sector involvement in the collective efforts for youth empowerment have to be encouraged. The private sector could be motivated either by investigating the sustainable direct impact in productivity and profit resulted from securing a skilled workforce, and - or even primarily - by incorporating social responsibility (CSR) factors.
- It is also recommended to create favorable and stimulating conditions for the involvement of companies, businesses and financial actors to include young people and women, especially in the water and food sectors.
- Basic infrastructure is an important prerequisite for socio-economic development in modern societies, both in terms of overall advancement and for youth innovation. Better communication infrastructure and innovation ICT-based services could significantly contribute in closing the gap in regional cooperation and boost youth innovation in the water sector.
- In the Arab region, there is a lot of common heritage and public acceptance for regional integration which is waiting to be invested in, such opportunity is lacking in other regions. Thus, a substantial cost for initiating the regional cooperation in terms of social awareness is already saved and the majority of investments should be diverted into lobbying for political will, supporting the regional integration body developed by AWC and supervised by the Arab league, through regional education programs, regional research and development projects.
- The inclusion and empowerment of young people and women is a strategic priority for the CIHEAM. This issue will be the main theme of its 12th Ministerial Meeting to be held in Spring 2022. In addition, the celebrations for the 60th anniversary of the CIHEAM in 2022 will be an opportunity to put young people and women at the center of the organization's future programming (training, research, cooperation projects etc.). As such, the CIHEAM (General Secretariat and institutes) is at the disposal of the AWC to develop new partnerships able to participate in the objectives mentioned above.

Messages and Recommendations

The forum thematic sessions witnessed excellent presentations, great interactions, and hot discussions on the topics presented by the speakers. The interweaving and interconnections between the forum's themes was clear in most of the topics presented. A topic on water security was not devoid of talking about sustainability. Likewise, the sustainability topics viewed sustainability as a prerequisite for water security. The notion of regional cooperation on transboundary water was a common denominator in many presentations on water security and sustainability. Thus, the messages came from different session are complementary. They expressed common agreements of the forum's participants. Messages are listed in this section under the titles of the 3 main themes of the forum.

1. On Water Security

- Water is a factor of economic stability, peace and security for human societies and a basic pillar of sustainable development. It is essential for health and indispensable for the most essential activities of society: agriculture, energy, transport, etc. The Arab region is the world's most water scarce. It receives only 1% of the world's renewable water resources, although it accounts for more than 5 per cent of the world's population. Dwindling water supplies mean human suffering and an increased risk of instability, conflict and migration. Water scarcity that characterizes the Arab region, challenges its water security, which in turn affects food security, energy security, economic development, livelihoods and human health. This is why the issue of water security has become the focus of attention, and at the forefront of strategic priorities for all Arab countries.
- In addition to the challenge of water scarcity, the Arab region is facing unprecedented challenges caused by climate change, population growth and pollution. Water-related challenges in the Arab region will increase and become more stressful in light of the growing demand for water and the scarcity of resources, giving way to unregulated and uncontrolled urban expansion which is highly water consuming. Rise in the standard of living, and the increasing demand for manufactured products and public services lead to ever-increasing water consumption. A subsequent result is creation of intense land and water pollution with many health and environmental serious implications.
- Climate change is a regional issue having implications on different types of securities including human security, socio-economic security, water and food security, as well as the security of livelihoods. Future effects of climate change will impose further pressure on water availability disrupting the efforts made to achieve water security. Climate change act as a threat multiplier since it intersects with pre-existing risks and vulnerabilities. Climate change is a transboundary issue and as such regional collaboration is needed to address

climate security. In addressing water and climate change together the region will need to consider multiple critical dimensions and risks. By threatening local livelihoods climate change becomes a migration driver. We need to better understand climate migration and design policies in a way that specifically protects vulnerable populations. This requires an interconnected way that takes a nexus approach to consider water scarcity and build on coordination and cooperation. The region needs better data and models to better understand climate change impacts as a mounting security issue.

- Water Security needs demand rather than Supply management within integrated water resources management (IWRM) framework. Sharing knowledge and success stories between Arab countries and cooperation in water conservation strengthen Arab water security. Technology packages, institutional arrangements and financing mechanism as well as efficient water services from water supply facilities including desalination infrastructure, domestic water collection networks and treatment plants, efficient irrigation systems and emergency storage facilities are necessary tools.
- Water security is conditioned by diversified water sources to achieve a balance between water supply and demand in the Arab region. This requires "production" of more water resources which is expected to come mainly from non-conventional water especially through desalination and wastewater reuse. Construction of new desalination facilities using modern technology can make difference in facing the challenge of water scarcity. Reuse of domestic wastewater and agricultural drainage water provides more interesting prospects for the future, especially for agricultural production. Taking into account the environmental impacts in both cases is vital for sustainable development of these resources. Modern wastewater treatment plants ultimately discharge water that is suitable for human at least, for agricultural production.
- Desalination will be a main contributor to meet the future increasing water demands in the Arab region. Investments in infrastructure and R&D in innovative technologies including membranes development and renewable energy will lower desalination costs and make it more affordable and sustainable in the future. This has to be accompanied with building specialized capacities and skills of operators and manpower in desalination. Arab countries need to move more aggressively into localizing the production of desalination technology to reduce the cost of desalinated water. Governments have to encourage and facilitate the private sector investment in the business of saline water desalination.
- National policies in the Arab region must recognize water reuse as part of their water strategy. There is a dire need to bring Arab countries together through partnerships and regional projects on wastewater reuse. Effort is needed to develop a business case to promote the wastewater reuse at different levels of users being; governments, public, farmers, ...etc. Wastewater reuse

quality, safe reuse codes, standards and guidelines are needed to change the perception of risk. There is an important role of LAS and AWC to lead shaping the regional standards of water reuse including capacity building at different levels.

- The Arab region can bridge the gap of food production for food security by simultaneously working on making water resources available (e.g., reuse, desalination and water harvesting), working on agronomy (more crop per drop) and efficiency (more crop per kilowatt and per unit land), and implementing demand management measures, with adaptive approach putting in place innovative solutions through research and technology. Water use efficiency is necessary to increase agricultural productivity. Adoption of appropriate criteria in modernizing irrigation, spanning from state-of-the art irrigation technologies all the way to innovative irrigation scheduling and delivery mangement, are indispensable to increase agricultural productivity.
- As water use is intricately linked to food production and the region is facing a food security crisis, there are needs to more innovative thinking on how to use unconventional water sources in agriculture and food production. Innovative research and science are key to leveraging the untapped potential of food production under water scarcity and climate change, but this needs to be done through transdisciplinary work built on a sound understanding of local cultures and conditions. Reuse of treated wastewater in irrigation and other purposes should take into consideration all awareness factors such as mass media campaign to increase public acceptance, review existing laws, update standards and guidelines, monitoring programs, tariffs against cost recovery plans, ...etc. Non-conventional water resources, salt and drought tolerant crops represent important opportunities, where there are tested technologies and know-how available in the region
- The interlinkages and dependencies between Water Security, Food Security, Energy Security and Climate Security need to be addressed in national water strategies in a nexus approach which takes into consideration the socio-economic differences in societies. A good start is to work on the watershed level and review national strategies in the region. Although it's challenging, water shed management options needs more quantitative indicators in the water energy food nexus framework instead of qualitative ones. Tradeoffs of management choices had to be comparable in a unified indicator methodology in order to solve these multi-objective managerial decisions.
- Global changes and the increase in future demand for water and energy will force more discussion, exchange of ideas, exchange of experiences, and joint work to build future capabilities able to face and overcome water challenges. Regional and global experiences show that knowledge, technology, policy and institutions need to evolve together to achieve water security. Coherent and cooperative local and international work has become more urgent than ever to enhance the integrated water resource management approach. Dialogue

between the various actors will enhance joint cooperation, innovative solutions, and public and private initiatives in order to ensure better water security and sustainability. LAS and AWC together with support from the development partners can assist in addressing the water scarcity challenges.

2. On Transboundary Water Cooperation

- Water in a river basin is a natural cycle which appears as Blue Water (runoff forming flows in natural streams and rivers) or Green Water (in the form of naturally grown forests, pasture or rain-fed agriculture). Water does not recognize political boarders and no one being a tribe, community, sector or state can claim ownership of water in a shared river basin. Ownership and usage rights are different concepts that had to be differentiated. Water security for countries depending on transboundary water, means fair and equitable share of benefits when negotiating water rights of the riparian countries. Both "Green Water" "Blue Water" should be considered in negotiating fair shares.
- In the Arab region, about 64% of the total available renewable surface water resources are transboundary water shared with non-Arab upstream countries. All Arab countries that are sharing transboundary water resources face unresolved challenges with the upstream riparian countries to get their fair and equitable shares, a situation that not only negatively affects their sustainable socio-economic development but threaten the right of existence of about 200 million persons in the Arab region.
- No deeper gap has been witnessed in this history between the level of global challenges and the extent of the "actual" global cooperation required to confront these challenges, than the gap exists now in joint cooperation in the field of transboundary waters. Water of transboundary rivers should be an opportunity for cooperation and not a reasons for conflicts. Negotiation about equitable shares should not be politicized and remain technical and instead be a platform for seeking opportunities of mutual benefits, development and economic growth for all. This requires political will of the riparian countries and support from the regional and the international organizations. It is important to depoliticize water issue by emphasizing its human, environmental and social aspects. Cooperation in shared waters must be strengthened and laws must be enforced to obligate upstream countries not to violate the water rights of downstream countries.
- The most prominent challenge threatening sustainable development in Egypt and Sudan is the construction of the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile which represent direct threat to the water resources rights of Egypt and Sudan and in-turn has direct and sever impacts on the development and socioeconomic stability of more than 150 million people. A situation that could undermine peace and security in the Nile

basin and Africa. The two countries were engaged for more than 10 years in negotiations with Ethiopia to reach an agreement on filling and operating the dam in a way that does not cause serious harm to the two downstream countries and in the meantime secure Ethiopia's rights in development. All efforts failed due to lack of political will on the Ethiopian side. Instead, Ethiopia continued construction and filling the dam unilaterally, which represents a very dangerous threat to Egypt and Sudan.

- The three riparian states of the Blue Nile should re-engage in serious negotiations to conclude a binding agreement on the filling and operation of the GERD. The negotiation must be based on the common interest in exchanging benefits through dialogue and negotiation and by placing "humanity" at the center of the water issues. This requires political will to work together to promote more benefits for all. In the context of cooperation Egypt over many years offered support to the upper Nile basin countries for building dams, exploiting groundwater, aquatic weed control, transfer of technology, sharing knowledge and expertise, water resources management and agriculture and livestock development. Lessons from global experience show that contrary to popular belief, water risks have historically led more to cooperation than conflict both at national as well as international level.
- Iraq and Syria also face similar problems with the upstream countries of the Euphrates and the Tigris. The Turkish measures reduced the flow of the Euphrates River by building dams and expanding irrigation to new lands causing serious harm to the livelihood of the downstream population depending on the river. Historically water from these sources represents 70% of the water in Iraq which represents a life-line for sustainable development and food security in the country. In addition to threats to the life of people, reduced flow of the Tigris has immediate impact on the wetlands in south Iraq. Restoration of the flow is important in order to preserve their biological diversity and revitalize their ecosystem. On the Iran side, there is no agreement and no intention to cooperate. Cut-off of river flows coming from Iran has significant impact on water security of the Iraqi provinces close to the Gulf.
- Cooperation let all countries benefit from the basin resources without prejudice to the water rights of any country in the basin. A promising way for joint cooperation between riparian countries is to establish a body at the basin level to boost cooperation in various fields of water, food and energy, to enhance their economic, cultural and scientific relationships. Successful examples of managing shared water basins through treaties and specialized management organizations come from Senegal, where dialogue and participation represent the rule that must be worked on. Similar examples exist within many other transboundary river basins.
- It is time to pursue legal frameworks of international cooperation on transboundary water governance - be it the two global UN Conventions and/or other relevant Basin agreements. Rights in shared water resources deserve

recognition from the international community similar to Resolution 64/292, of the United Nations General Assembly recognizing water and sanitation as a human right. An alliance of downstream countries is proposed to work as a knowledge-motivated driver and a powerful tool in defending their water rights in the international arena emphasizing its socio-economic and humanitarian aspects of shared water resources.

- Expertise in water diplomacy is becoming crucial in negotiating water rights and reaching agreements between riparian countries. Water diplomacy skills is equally important for diplomates as well as technical and legal experts participating in a negotiation process. With the mounting problems on shared water resources, the Arab countries may consider forming an advisory body as a "Water Diplomacy Council", under the umbrella of LAS to support the Arab countries when negotiating transboundary water issues. Such body can also develop and adopt strategies and road maps for negotiation that could preserve the rights of Arab countries in shared water resources. The Arab Water Council with its rich expertise can perform the task of formulating programs for such body. The Arab Water Academy can play the training and capacity building role in water diplomacy.
- Empowered civil society organizations and non-governmental organizations can play a major role in supporting the governmental efforts to bring the riparian countries together at one negotiating table and convergence of views, building partnerships and moving beyond the technical and political differences.

3. On Water for Sustainable Development

- Water scarcity needs to be better understood in a comprehensive context of sustainable development. Regional efforts and cooperation should highlight the importance of water as a key to security, safety, and peace. Although the Arab region made important achievements that should be celebrated, immediate sustainable water management actions are needed in the region that faces extraordinary water scarcity and a number of other compounding risks and challenges. Policy and planning approaches on water and sustainable development should be built on the "5-Is" principal: integration, innovation, information, infrastructure resilience and institutional reform. In order to make these transformations, awareness and capacities have to be built on multiple levels and across multiple stakeholders.
- The region is not on track for achieving the 2030 SDGs. In order to achieve SDG-6 on water and other water related SDGs, unprecedented transformations of water management and food production systems are needed. In this context the region needs to quadruple its existing efforts by increasing investments in water projects to accelerate the pace towards achieving the SDG targets. Necessary actions include increasing sanitation coverage,

reducing water demand per person, increase supply from desalination and treated wastewater.

- Nature is an important partner for humans in the need for water for its key role in achieving sustainability. Therefore, nature's share must be taken into account when drawing up water management plans and strategies for the sake of human health and environmental safety and the achievement of the 2030 SDGs.
- Sustainable development needs expanding use of Water Accounting for understanding the key trends in water uses and sources and monitoring every drop of water. Water Auditing and Water Governance Analysis, as a complementary approach, should be carried in an iterative process in order to gain a deeper understanding of the problems and select the most appropriate intervention.
- Sustainable agricultural water management requires knowledge and experience on best practices on investment in irrigation at the smallholder scale in the Arab Region. In the case of reclaimed water reuse in irrigation, the end user of the systems and the way irrigation water is managed are major factors when it comes to their long term impacts. An important lessons learned is to always consider the final user behavior along with the quality of effluent with respect to water management, crop type and safety measures. There are several success stories in the region that should be shared and scaled-up.
- Innovations and smart technologies will advance water sustainability and resilience worldwide either through improving the water efficiency use or developing alternative resources. Financing approaches and tools should be promoted to reward research and development in water related innovations and technologies (Water Hub). More investments are needed in capacity building programs, technical trainings and educational scholarships in the water sector taking into consideration humanities when discussing water management in social, cultural, economic and political contexts.
- NGOs need to be recognized as key partners in shaping the path forward and need to be more actively involved in the implementation of sustainability projects. Involvement of NGOs and the civil society in water issues helps in building a comprehensive "humanitarian" view that includes everyone, supports the concept of "right to water" for each member of society, and seeks symbiotic relationship between water security and sustainable development. Empowered women are active agents of change, counteract gender inequalities, and build resilient livelihoods in the context of water security for both men and women. The role of young people needs to be elevated in this process and they need to be engaged and integrated through key roles in decision-making.

- Development actors need to place greater emphasis on building the resilience of Water Supply and Sanitation (WSS) service providers in pre-crisis and during protracted crisis wherever possible. A major driver of decline in services during protracted crisis has been the lack of attention paid by development partners to resilience building prior to crisis. Pre-crisis partnerships would enable humanitarian actors to: (i) establish links with WSS service providers and their supporting ministries; and (ii) share knowledge of pre-crisis service delivery constraints. A strong partnership needs to be forged between humanitarian organizations, development actors, and local service providers (i.e. joining forces) to work towards strengthening the resilience of essential services before and during protracted crises without compromising humanitarian principles.
- The state of water and water services in Arab countries who are suffering from political conflicts and civil wars reached levels beyond misery. It is reflected in great suffering of the ordinary citizens especially the elders and children. The people of these countries whether in their home land or in immigrant camps need immediate actions to cancel all coercive measures and restore minimum decent life to access clean and safe water, particularly in the time of the global pandemic of Corona virus (Covid-19).
- IWRM is essential for alleviating the impacts of increasing freshwater scarcity in the Arab region, including on groundwater and shared water resources. Wide disparities exist between countries in the region and between countries within the same subregion in establishing institutions and engaging stakeholders for IWRM implementation.
- Many countries in the region need to strengthen the enabling environment for IWRM through policies, laws and plans. Opportunities exist for increasing financing for water projects when objectives are twinned with other development objectives related to health, human rights, food security and climate resilience.
- In order to advance progress on SDG 6.5.1, the following is crucially needed coherent governance within and across sectors, improving availability and access to data and information, leveraging innovation and technologies, unleashing female and youth potential and improving transboundary cooperation.
- Data availability and data sharing is key to advance progress on IWRM and all stakeholders are invited to collaborate in this regard in a effective and transparent way, namely governmental institutions, civil society, academia, and the private sector.
- A collaborative roadmap for Arab regional preparations leading to the United Nations Conference for the Midterm Comprehensive Review of the Water Action Decade is ongoing. Arab countries and regional stakeholders are invited to actively engage in this process through implementing activities that

explicitly support the Decade in the region, and voice regional water-related priorities, progress achieved, lessons learned, and challenges affecting the achievement of water-related SDGs in the region. The Arab roadmap will be regularly updated to reflect regional engagements throughout this process.

- Key policy messages generated from the 5th Arab Water Forum will be prepared to inform the preparation of the Arab regional preparatory meeting and regional report to the Midterm Comprehensive Review of the Water Action Decade.

Annex 1: Forum Program & Sponsors

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Program at-a-Glance
5th Arab Water Forum
21- 23 September 2021 - Dubai, UAE

Arab Water Security for Peace & Sustainable Development

	07:30 09:00	09:00 - 10:30	10:30 11:00	11:00 11:10	11:10 - 12:40	12:40 12:50	12:50 14:00	14:00 14:10	14:10 - 15:40	15:40 15:50	15:50 - 17:20	17:20 18:20
Tuesday Sep. 21st	Registration	Opening Ceremony (Baniyas 1)	Coffee Break	UTICO	Plenary Session 1 (PL-1) **Arab Water Security** (AWC, UAE) (Baniyas 1)	AlDharrah	Lunch Break	BAUER	(Panel Session) P1-PS1 **Water Security in The Mediterranean Region: Sustainable Water Reuse Strategies in Agriculture - Case Studies & Regional Perspectives** (NRD/UNISS, CIHEAM Bari, IWMI) (Baniyas 1)	Coffee Break	(Panel Session) P1-PS3 **Climate and Water Security in the Arab Region: From Words to Action** (AWC, LAS, UNDP) (Baniyas 1)	AWC Board of Governors Meeting (By Invitation Only) (Al Ameera 3)
								ENGIE	(Panel Session) P1-PS2 **Water Desalination as a Strategic Option for Sustainable Arab Water Security** (EAD) (Al Ameera 2)		(Panel Session) P1-PS4 **Investing in Small Scale Irrigation Schemes Versus Large Scale Irrigation Projects: Challenges and Opportunities Experience of IFAD and IWMI** (IFAD, IWMI) (Al Ameera 2)	
								DESALCOTT	(Panel Session) P1-PS5 **Egypt's Water and Sanitation Sector: Overview & Strategic Future Vision** (MHUUC) (Al Ameera 1)		(Scientific Session) P1-SS1 **Arab Water Security** (Al Ameera 1)	
		Arab Water Expo (Baniyas 2,3)					Official Opening	Arab Water Expo (Baniyas 2,3)				

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Wednesday Sep. 22nd

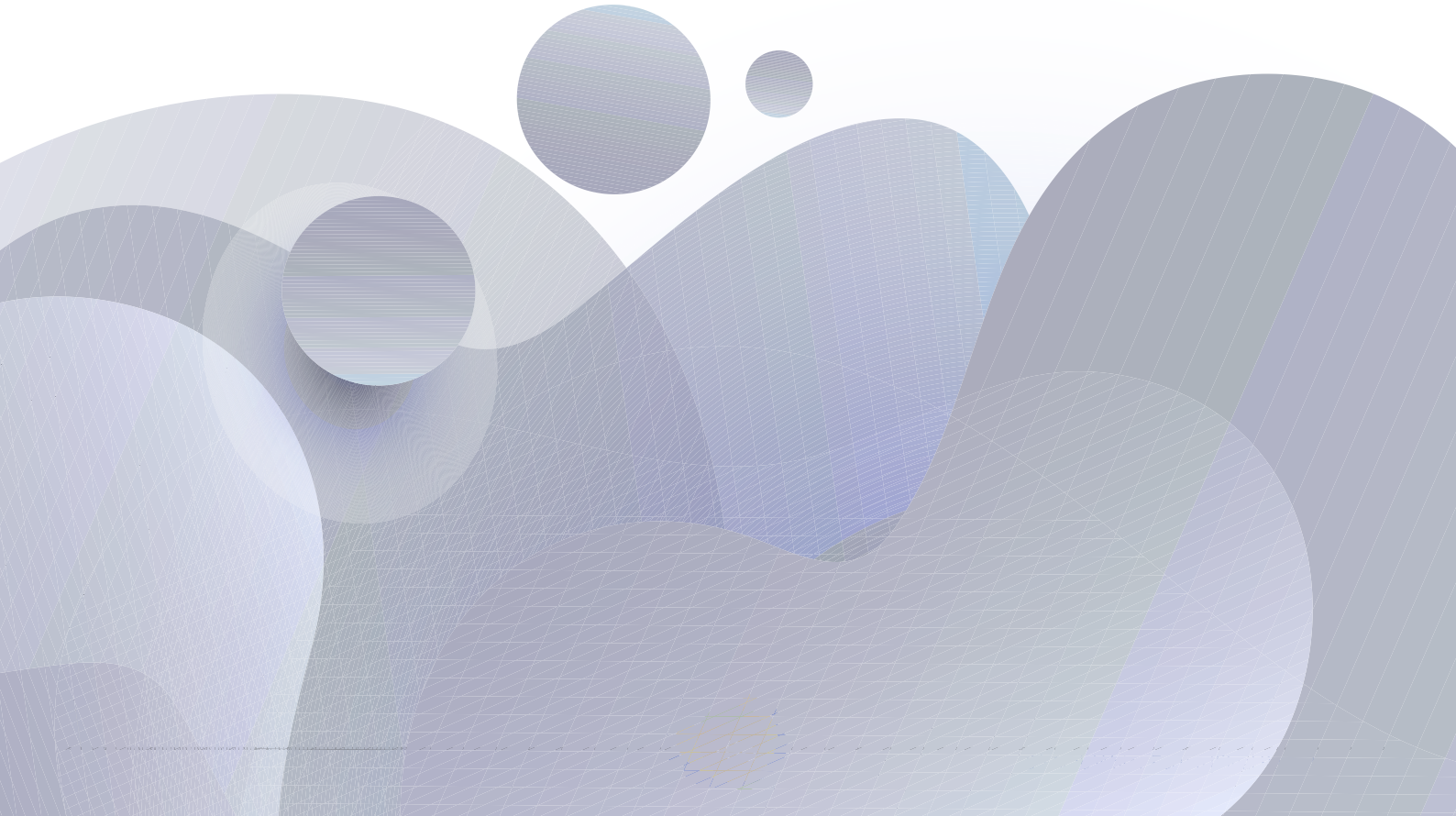
09:00 09:10	09:10 - 10:40	10:40 10:50	10:50 11:20	11:20 11:30	11:30 - 13:00	13:00 14:00	14:00 - 15:30	15:30 16:00	16:00 - 17:30
Saur	Plenary Session 2 (PL-2) **Transboundary Water Cooperation** (AWC, LAS, CEDARE) (Baniyas 1)	Beyond Water	Coffee Break		(Panel Session) P2-PS1 **Sharing Water & Benefits for Peace and Development** (CEDARE, AWC, EWP) (Baniyas 1)	Lunch Break	(Panel Session) P2-PS3 **Regional Cooperation & Coordination in Managing Shared Basins: Opportunities & Challenges** (Iraq) (Baniyas 1)	Coffee Break	(Cross Cutting Session) P2-CC2 **State of the Water In the Arab Region** (CEDARE, LAS, AWC, UNICEF, AOAD) (Baniyas 1)
				Tanqia	(Panel Session) P2-PS2 **Interconnected Innovations for Managing Water Scarcity to Enable Sustainable Food Security in the UAE** (FAO/SNG, IWMI, TU Delft, KTH, SEI, ICID) (Al Ameera 2)		(Panel Session) P2-PS4 **The Future of Water : Hopes and Concerns** (ASRT - Egypt) (Al Ameera 2)		(Panel Session) P2-PS5 **Report Launch: Water in the Shadow of Conflict** (WB) (Al Ameera 2)
					(Cross Cutting Session) P2-CC1 **Advanced Technologies and Early Warning Systems to Improve Agricultural Water Productivity in Transboundary Water Basins** (ICBA, ICARDA, ICID) (Al Ameera 1)		(Scientific Session) P2-SS1 **Transboundary Water Cooperation** (Al Ameera 1)		(Cross Cutting Session) P2-CC3 **Impact of Research, Technology and Innovations on Water Productivity** (IWMI, ICID) (Al Ameera 1)
ReWater MENA Project - Science Policy Dialogue on Reuse of Treated Wastewater in the Arab Region , (IWMI) /CGIAR, AWC, FAO RNE & LAS (By Invitation Only) **(Al Ameera 3)**									
Arab Water Expo (Baniyas 2,3)									

Thursday Sep. 23rd

09:00 09:10	09:10 - 10:40	10:40 10:50	10:50 11:20	11:20 11:30	11:30 - 13:00	13:00 14:00	14:00 - 15:30	15:30 16:00	16:00 16:30	16:30 17:00	17:00 17:30	17:30 - 18:00
Eshara Water	Plenary Session 3 (PL-3) **Water for Sustainable Development** (AWC, LAS, ICARDA, SWA, IFAD, ESDF/RAED) (Baniyas 1)	TEDAGUA	Coffee Break		(Panel Session) P3-PS1 **Accelerating Action on IWRM for Sustainable Development through the Water Action Decade** (ESCWA, LAS, AWC, ACSAD, UNEP/DHI, CEDARE, FAO) (Baniyas 1)	Lunch Break	(Panel Session) P3-PS3 **Regional Water Accounting and Auditing** (FAO, IWMI) (Baniyas 1)	Coffee Break	Towards 9th World Water Forum (WWF9 Secretariat) (Baniyas 1)	Human Capacity Development for Sustainable Water Resources Management (AWA, AWC) (Baniyas 1)	Arab Water Prize Winners 2021 (Baniyas 1)	Closing Ceremony (Recommendations & Key Messages) (Baniyas 1)
					(Panel Session) P3-PS2 **Leveraging The Untapped Potential of Food Production Under Water Scarcity and Climate Change in The Arab Region** (ICARDA, ICID, FAO) (Al Ameera 2)		(Panel Session) P3-PS4 **Humanitarian and Development Support for Water and Sanitation Providers in MENA** (ICRC, UNICEF, WB) (Al Ameera 2)					
				PSIPW	(Scientific Session) P3-SS1 **Water for Sustainable Development** (Al Ameera 1)		(Cross Cutting Session) P3-CC1 **Research & Innovation for Youth Engagement in MENA's Water Sector** (CIHEAM Bari, AWC) (Al Ameera 1)					
Arab Water Expo (Baniyas 2,3)												

	Plenary Sessions (PL)		Panel Sessions (PS)		Special Sessions
	Cross Cutting Sessions (CC)		Scientific Sessions (SS)	P3	Priority 3
PI	Priority 1	P2	Priority 2		Private Sector Interventions

Annex 2: 5th Arab Water in Numbers



600+
Attendees (physical and virtual)

8
Miniseries

11
Minister Speeches

20
Keynote Presentations

160
High level Speakers

31
Total Nationalities

16
Arab Nationalities

40
Sponsor and Exhibitors

3
Plenary sessions

14
Panel sessions

3
Scientific Sessions

4
Cross-cutting sessions

Annex 3: Fact Sheet

Annex 3: Fact Sheet[5]

Arab Water Scarcity: In 2020, 13 countries out of the 22 Arab countries were below severe water scarcity limit of 500 m3/ person/year of blue renewable water resources. In addition, 18 countries of the 22 countries were below the scarcity limit of 1000 m3/ person/year compared with 17 countries in 2015.

Virtual Water: Virtual water in food imports in 2018 was 439 BCM and 415 BCM in 2019 but decreased to 361.15 BCM in 2020 mainly due the COVID-19 pandemic. Agricultural exports increased from 2017 to 2018, peaked in 2019 and decreased in 2020.

Climate Change: The most recent IPCC report clearly highlights the challenges for the water and agriculture in the Arab region, with an expected warming by about 3 degrees by end of century and summer temperatures that could be up by 8 degrees in part of the region.

Desalination: For producing more water, today, around 20 000 desalination treatment plants are functioning all over the world, 30 % of which are in the Arabic countries, both to generate energy and for domestic and industrial uses.

UAE Foreign Assistance: As contributions in the field of international cooperation and development assistance related to water and sanitation UAE offered to the most-needy countries during the period 2015 to 2020 amounted to nearly three billion dirhams.

Egypt Meeting the Challenge: to counter the challenges of water scarcity, Egypt to implement projects worth $50B through implementing programs to improve the efficiency of irrigation water and water recycling mechanisms, and applying modern irrigation and agriculture techniques.

Egypt invest more in water reuse: in 2020, construction of Al-Mahsamah agricultural water treatment plant is a completed with a capacity of one million m3/day at a value of about 2 billion Egyptian pounds. In 2021 Bahr al-Baqar treatment plant, was inaugurated with a capacity of 5.6 million m3/day at a cost of about 14 billion Egyptian pounds.

More desalination in UAE and Egypt: During the coming years from 2021 to 2023, EAU will add a production capacity of 420 million gallons per day of desalinated water to be added to the total installed capacity of 1,590 million gallons per day. Egypt aggressively entered the era of desalination plants and for the first time the production of desalination plants exceeded in 2021 more than 800,000 cubic meters per day.

5 Based on citations from the speakers during the sessions.

Improved Sanitation in Egypt: in 2021 sanitation services coverage in cities exceeded 96%, and in rural areas reached 40%, compared to 12% in 2014.

Promoting new Solutions: It is the role of all of the Arab Water Council, the World Water Council and many others - to bring together all those who think about the future of water and to promote concrete solutions and responses to put an end to the suffering of water.

9th World Water Forum: Senegal and the World Water Council, by organizing the 9th Forum, intend to consolidate the political dimension of water, particularly its contribution in peace building, development and socio-economic resilience in the context of the post-Covid-19 recovery.

Arab Water Security for
Peace & Sustainable Development

UNITED ARAB EMIRATES
MINISTRY OF ENERGY & INFRASTRUCTURE

www.arabwaterforum.org