Cairo2019
Water Week

Conference Report

CWW 2019

RESPONDING TO WATER SCARCITY

20th - 24th October,2019, Cairo - Egypt

CONTENT

CONFERENCE BOOKLET

ACKNOWLEDG

LETTERS

EMENTS

On behalf of the Cairo Water Week 2019 team, we would like to express our cordial thanks to all who helped make this conference a success. We would not have been able to reach that success for the CWW 2019 without the support of many individuals and partner organizations that dedicated their time resources and passion over many months to bring the conference to what it was.

Several teams and persons deserve special recognition due to their role in the success of the conference. All sponsors, session conveners and speakers were behind making the conference a true success. Success was evident not just by the great number of participants, which exceeds the 1200 participants from all over the world, or the many sessions organized, but also by the quality of speeches, presentations and contributions made.

The preparation of this report was not possible without the outstanding work and dedication of the reporting team who carefully and successfully captured the highlights of each session and the editing team who exerted sincere efforts in reviewing the report's content and producing the final version.

The leadership and guidance of the distinguished Higher Committee; chaired by H.E. Dr. Mohamed Abdel Aty - Minister of Water Resources and Irrigation of Egypt; remain the true drivers for the successful organization of the conference and its associated activities.

Last, but not least, we would like to thank all chairmen, co-chairmen, keynote speakers of the respective sessions and all members of the Scientific and the Organizing committees, without their tireless efforts the conference would not have been possible.

We hope that our report honors your trust and advances your hopes for the future.

OVERVIEW

Egypt's water sector is facing drastic challenges, as Egypt is located in arid zone and 97% of the fresh water is coming from rivers, originate from outside its borders and require additional basin perspective, due to their geographical position. Similar to Most of countries in arid zones; Egypt suffers from water scarcity and is vulnerable to climate change impacts.

Water resources are the most important pillar for achieving national security. The comprehensive sustainable development plans in all fields are linked to the state's ability to provide the necessary water resources to implement these plans, and for that , was the decision of the State to organize the "Cairo Water Week". the first Cairo Water Week (CWW) which was held in October, 2018; where five Sub-themes were tackled among more than 1,000 participants and 70 international experts from different nationalities through 50 technical sessions in cooperation with more than 50 national, regional and international organizations; Moreover, 25 companies participated in the exhibition. The 1st CWW has successfully established an effective platform for all stakeholders for better policy making process and to support governmental and non-governmental efforts to face water scarcity challenges.

The second round of the Cairo Water Week will address the main theme "Responding to Water Scarcity" through five sub-themes overarching a broad spectrum of the water scarcity issues and sustainable development goals. Under each sub-theme, variety of topics could be covered for the sake of the countries development. Furthermore, CWW 2019, as a prestigious regional event, will present multiple opportunities and actions to promote and enhance interactions and knowledge sharing between members of the water community and stakeholders.

The main theme of CWW 2019, "Responding to Water Scarcity", was covered through main five sub-themes as followings:

Theme 1: Achieving SDGs under Water Scarcity

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs and from that prospective sustainable development calls for concerted efforts to build a resilient future for our societies. Water is at the core of sustainable development and is critical for socio-economic development, healthy ecosystems and for human survival itself. It is vital for reducing the global burden of disease and improving the health, welfare and productivity of populations. It is central to the production and preservation of a host of benefits and services for people. Inter-linkages between water, energy, food and environment would also contribute to sustainable development. This sub-theme focused on water for sustainable development considering the following topics:

- Promoting efficiency in domestic, agricultural and industrial water use.
- Mitigating water quality degradation and pollution clean up.
- Coping with water scarcity to achieve food security.
- Water accounting for optimum water management.
- Making clean water and safe sanitation accessible and affordable.
- Inter-linkages between water, energy, food and environment.
- Managing water to alleviate poverty and hunger.
- Progress towards achieving Goal 6 of the SDGs.
- Public-private partnership (PPP) in water management.

Theme 2: Cooperation in Water Sector

Cooperation over shared water resources is crucial for climate change adaptation, regional stability and economic growth. It could create new opportunities for riparian states to sustainably develop their common water resources and assist decision-makers and practitioners to reduce conflict, and increase economic development. Despite that, about two-thirds of the world's transboundary rivers do not have any cooperative management framework. Shared water resources must be seen as a tool for cooperation and for promoting equitable allocation of water resources and their benefits. Regional cooperation in a transboundary context is considered a key solution towards achieving water security. This sub-theme addressed the importance of promoting regional cooperation considering the following topics:

- Water scarcity & benefit sharing.
- Case studies of regional cooperation on transboundary water.
- Knowledge sharing and exchange between riparian countries.
- Transboundary water governance.
- Water diplomacy and Hydro-politics.

Theme 3: Research and Innovation in Facing Water Scarcity

Science and Innovation are the pillars to achieve effective progress for any nation`s development. Innovations in water development and management open new horizons and bring new opportunities to face water scarcity. The research and innovation sub-theme focused on the up-to-date applications of scientific and technological innovations in water management to help countries tackle their water challenges and ensure sustainable development. The sub-theme aimed at encouraging sharing of information and technological action tools for imminent water challenges considering the following topics:

- Methods and tools for better water management.
- Smart water management for productivity.
- Agriculture research for water saving.
- Managing multi-objective infrastructures.
- Nanotechnology applications in water.
- Using of remote sensing for water management.
- Youth innovations for maximizing water benefits

Theme 4: Climate Change Impacts, Mitigation and Adaptation

The Earth's climate has changed throughout history but these days the rate is unprecedented and radically affects all aspects of Life. Climate change is a vital player for the future of our planet, as it has drastic impact on water resources, human health and wellbeing, wild life, ecosystem services, food security and on the environment in general. Extreme events such as floods and droughts have significant impacts on societies. This sub-theme focused on two questions: "how will climate change affect the water cycle" and "what are the key mitigation and adaptation strategies for reducing the environmental risks". Considering the impact of climate change on quality of life, health and food security, the subtheme considered the following topics:

- Adaptation and mitigation measures under severity conditions.
- Adaptation to CC impact on water, environment and ecosystems.
- Adaptation to CC impacts on agriculture and crop production.
- Flood and drought risk management.
- Sea level rise and integrated coastal zone management.
- Vulnerability of arid regions to CC.

Theme 5: Non-Conventional Water Resources Use under Scarcity Conditions

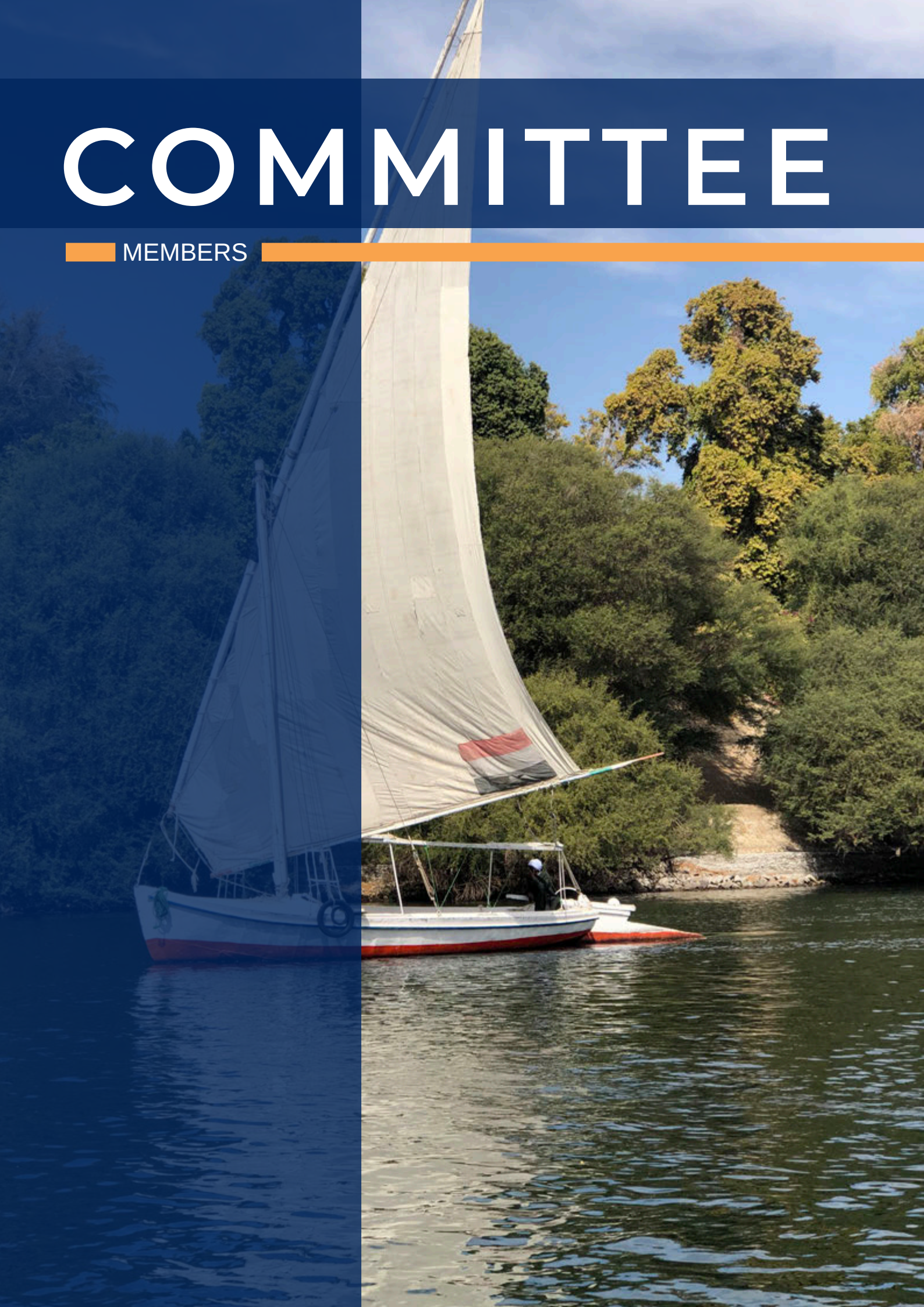
With natural water supplies no longer meeting the growing demand in several countries throughout the region, non-conventional water resources, such as treated wastewater reuse and desalination, are increasingly becoming an additional contributor to water availability. Related environmental, energy, health and other impacts need to be carefully considered while defining the potentials and limitations of such options. Improving non-conventional options demands better planning and regulation; coordinated investment; monitoring of operations; building managerial capacity; and, where relevant, mitigating their negative impacts including along the coastline. Overall, where development of nonconventional options is necessary, it should be combined with water demand management actions. In relation and beyond these, a strong demand for integrated urban water management, including through blue-green approaches and practices, has emerged. Moreover, non-conventional water resources could offer great potentials but also include many challenges. The sub-theme addressed the enabling environment for non-conventional water resources development and operation through the following topics:

- Low cost sewage water treatment & utilization.
- Role of non-conventional water in water scarce environment.
- The latest in desalination technology and development.
- Economic use of brackish water for agriculture and aquaculture.
- Nature based methods for polluted drainage water treatment.
- Reuse and recycling of treated wastewater and agricultural drainage water.

Moreover, on the regional and international dimensions, the week hosted high level events. This year, the Ministry of Water Resources and Irrigation hosted the “OIC Water Council” meeting that was held on 21st and 22nd of October 2019 under the umbrella of the Organization of Islamic Cooperation (OIC). In addition, the week hosted the Presidential Championing Infrastructure Initiative – Inter-Ministerial Committee Meeting. The meeting considered the Technical Report of the Technical Task Team Project Status Report (TTT), and the ministers also presented all hindrances and constraints that might encumber the smooth project implementation. And on the Arabian side, The Cairo Water Week hosted the meeting of the Joint High-Level Committee between water and Agriculture under the umbrella of League of Arab States (LAS). Furthermore, the Week hosted the Egyptian Dutch Water Advisory Panel Meeting and other several important side events.

COMMITTEE

MEMBERS



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GENERAL SUMMARY

CHAPTER 1

Under the patronage of His Excellency President Abdel Fattah El-Sisi, the President of the Arab Republic of Egypt, in Cairo, the city that hosted one of the largest water events at the national, regional and international levels in the field of water resources management.

The activities of the Cairo Water Week 2019 (CWW-2019) in its second edition under the title: "Responding to Water Scarcity" and were carried out during the period from 20 - 24 October 2019.

The event is organized annually by the Egyptian Ministry of Water Resources and Irrigation in cooperation with several national, regional and international partners. For the year 2019 edition, it was held at Al-Manara International Conference Center in the New Cairo for five consecutive days.

The CWW-2019 aimed primarily at enhancing water awareness, encouraging innovations to meet water challenges, identifying global initiatives and efforts to address them, and following up on modern tools and techniques used in water resources management. In addition, consideration was given to ways of maximizing cooperation mechanisms in the water sector.

The conference provided an opportunity for academics, scientists, policy makers and water resources experts from around the world to present and discuss key issues, plans and actions related to responding to water scarcity challenges.

It also translated the vision developed during the first Cairo Water Week 2018 into actions towards best practices and appropriate implementation plans, as well as emphasizing the transfer of knowledge and how to obtain it by supporting successful public and private business models and identifying opportunities, constraints and capacity building needs.

The Cairo Water Week has become the focus of interest for all stakeholders in the water sector, making it the most important and largest water event in Egypt, Africa and the Middle East, which in turn made it the focus of support and attention of all concerned with water locally, internationally and regionally.

The main focus of the CWW-2019 was the management of water resources within the framework of "Responding to Water Scarcity". This was discussed through five sub-themes as follows:

The Main Themes of the CWW-2019

- Achieving SDGs under Water Scarcity.
- Cooperation in Water Sector.
- Research and Innovation in Facing Water Scarcity.
- Climate Change Impacts, Mitigation and Adaptation.
- Non-Conventional Water Resources Use under Scarcity Conditions.

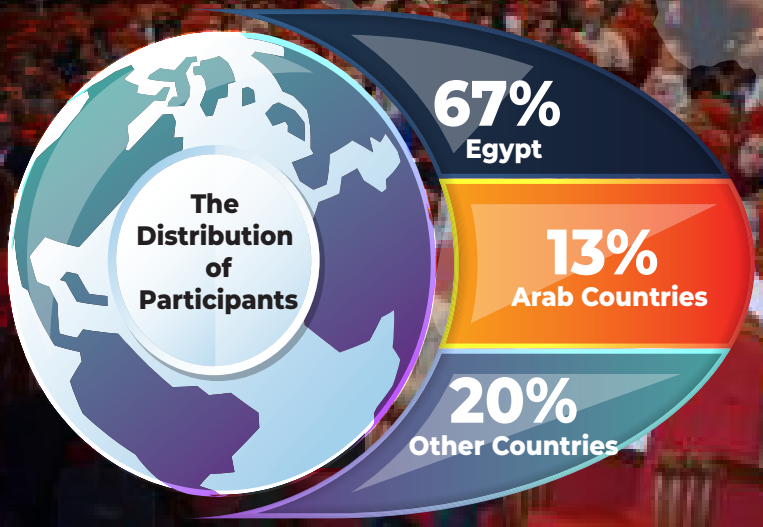
The CWW-2019 also included many different activities that aimed at enhancing the exchange of experiences and knowledge between relevant partners and all stakeholders related to the water sector.

EVENTS AND NUMBER OF ATTENDANCE AND PARTICIPATION

1300 Participants from **100** Countries

5 Plenary Sessions

45 International Bodies Participated



10 Side Events & Workshops

70 World-Renowned Water Scientists

5 High-Level Events

45 Technical Sessions

High Level Political Activities

Second meeting of the OIC Water Council

Under the umbrella of the Organization of Islamic Cooperation (OIC), which comprises 57 Islamic countries, the Arab Republic of Egypt hosted the meeting of the OIC Water Council in which 9 official delegations participated.

The Ministry of Water Resources and Irrigation, in cooperation with the OIC General Secretariat and the focal points of the Member States, coordinated and organized to host this important event for consultation and dialogue on water issues as well as activities of exchange and transfer of expertise among OIC countries.

It is worth mentioning that Egypt took over the presidency of the Water Council during the activities of the election of the Bureau in addition to many activities, including procedural sessions, the election of the Bureau, the speeches of delegations heads, the adoption of draft resolutions on the meeting in addition to technical sessions containing seminars on water conservation and ways confronting water scarcity as well as technical sessions on shared water between countries and ways to benefit from it and the challenges facing them.

Presidential Infrastructure Initiative - Joint Ministerial Committee Meeting

Within the framework of activating Egypt's leading role in the African continent, President Abdel Fattah El-Sisi, the President of the Arab Republic of Egypt, presides over the current session of the African Union. The initiative emphasized the pivotal role played by the Egyptian State in full coordination between governments, the private sector and civil society among the countries of the continent.

It is worth mentioning that during the meeting, Sudan's membership was ratified as part of the Presidential Initiative - this decision will be shared at the level of Heads of State at the African Union Summit 2020. Côte d'Ivoire also presented the Abidjan-Lagos Highway Project as the State Project under the umbrella of the Presidential Initiative for Infrastructure Development.

Egyptian-Dutch Water Management Advisory Panel Meeting

Within the framework of the joint cooperation between Egypt and the Netherlands, the meeting of the Egyptian-Dutch Water Management Consultative Council was held on October 23, 2019 in Cairo by Dr. Mohamed Abdel Aty, Minister of Water Resources and Irrigation and the Dutch side by Mrs. Lise van Duen, Director of Water at the Netherlands Ministry of Infrastructure and Water.

The meeting was held as an important official event for the Cairo Water Week. The meeting discussed a number of topics under the themes of the Memorandum of Understanding between the two sides: water and agriculture, integrated coastal zone management, and wastewater management.

The meetings were attended by representatives of the Ministry of Water Resources and Irrigation, the Ministry of Agriculture and Land Reclamation and the Holding Company for Water and Wastewater.

Representatives from the Ministry of Infrastructure and Water, the Ministry of Foreign Affairs and the Dutch Water Partnership, the Netherlands Environmental Assessment Authority, the Dutch Embassy in Cairo and a number of Dutch experts attended the meeting.

The Egyptian and Dutch sides reviewed the most important studies and work tasks that have taken place since the last meeting of the Council held in April 2019.

High - level Joint Technical Committee on Water and Agriculture at the senior official level

The League of Arab States, in cooperation with FAO, ESCWA and the Arab Organization for Agricultural Development, organized the first meeting of the Joint High-Level Committee on Water and Agriculture in the Arab Region during the period from 23-24 October 2019 under the title "Towards more sustainable mechanisms for more sustainable water resources". As a first step to implement the decisions of the Joint Ministerial Meeting of the Arab Ministerial Council for Water and Agriculture and the Cairo Declaration on the Coordination of Water and Food Security In the Arab region, held in Cairo, April 4, 2019.

The first meeting of the Committee was inaugurated by the representatives of the Food and Agriculture Organization (FAO), the United Nations Economic and Social Commission for West Asia, the League of Arab States, the Arab Organization for Agricultural Development and representatives of the Ministries of Water of Palestine and Jordan.

The meeting presented the responsibilities and goals of the High-Level Joint Committee including the background of institutional coordination between the water and agriculture sectors in addition to the Outputs of the first joint ministerial meeting. It Highlighted the Cross-Sectorial Issues and Prioritization of the High-Level Joint Committee Work Program for the Next Phase including Cross-cutting issues between the water and agriculture sectors, follow-up with the mechanism to implement the Cairo Declaration, Proposed program of work of the Committee for the next five years within the exchange of experiences between Arab countries and other regions to transfer knowledge and increase capacities.

1.4 Important Activities on the Side of the Week

The week included many important technical activities hosted by the week such as:

The Conference of Youth Specialists in Water: The African Youth Forum was held in its second session in the field of water under the auspices of the International Commission for Irrigation and Drainage, which included holding special training for the participants.

The Forum on "Water Governance and Financing in the Water Sector": It was organized by the European Union in cooperation with the Union for the Mediterranean (UFM) to discuss Mediterranean and Egyptian issues, which included the vision and plans of the Union for the Mediterranean for achieving sustainable development.

Workshop on the Current Status of Higher Education, Water, Research and Training: The Center of Water Excellence in cooperation with reputable Egyptian and international universities including (American University in Cairo, Alexandria University, Ain Shams University, Beni Suef University, Zagazig University, Aswan University, Temple University, State University Utah, University of California, Washington State University) presented the current state of higher education, research and training, challenges related to the Egyptian Water Strategy for Sustainable Development, and ways to move forward to meet such challenges and eliminate gaps.

Workshop on advanced water accounting and training methods for the analysis of water accounting.

The 70th meeting of the Governors of the World Water Council included meetings of the Working Group, the International Steering Committee (ISC) and the Bureau.

A training program on IWRM was held to raise capacity. This provided an opportunity for participants to share their vision in designing and evaluating the response to water resource management problems. The program was held as a contribution from Egypt to implement the OIC Water Vision. The course was organized by the National Water Research Center (NWRC), the research arm of the Egyptian Ministry of Water Resources and Irrigation.

Workshop on Supporting Urban Nexus in the Middle East and North Africa (MENA): This was to mainly discuss the way forward to support water, energy and food interdependence at the level of local governments (MENA)

through restructuring their governance for appropriate working conditions.

Water Children Forum aimed to raise the awareness of children from the governorates of Egypt (focusing on Upper Egypt and Sinai governorates) on water and environmental issues through interactive technical and educational activities. It also aimed to encourage children to innovate with regard to water. The forum also explained some water and environmental issues for children, where literary workshops, puppet theater workshops and plastic arts workshops were held. STEM students also shared their innovations in the field of water.

A Journalists Grant was given to Four (4) African journalists out of 50 journalists from African countries.

Graduation Projects Competition: This was held for all public and private universities to select the best graduation projects in the field of irrigation, hydraulics, water management.

A Competition for Best Water Saving Practices was held in the National Water Conservation Competition in cooperation with the European Union. The winners were honored at the closing ceremony.

A competition was presented to present the abstract of a scientific thesis in just three minutes to develop researchers' academic skills, presentation skills and research communication skills with all segments of society.

The Competition of the Best Applied Research in the field of water sciences and applied methods to rationalize water consumption.

An exhibition was held that included companies working in the field of water and desalination technology, where a number of 25 private companies in the field of water and related technologies participated.

1.5 Plenary and Technical Sessions of the Week Themes

- Five plenary sessions were organized including speakers from the world's best water experts.
- 45 technical sessions were organized involving water scientists and experts from inside and outside Egypt.
- Technical and public sessions in partnership with FAO, where technical sessions were organized for the latest technological means in the field of rationalization and management of water resources as well as participation in the exhibition held on the sidelines of the week.
- Technical sessions in partnership with prestigious universities, institutes and international organizations.
- Participation with Egyptian universities by organizing a number of sessions.

HIGH LEVEL POLITICAL MEETINGS

CHAPTER 2

2.1 The Fourth Conference of OIC Ministers of Water

Under the umbrella of the Organization of Islamic Cooperation (OIC), which comprises 57 Islamic countries, Egypt hosted the meeting of the OIC Water Council with the participation of Excellence ministers from Sierra Leone, Senegal, Saudi Arabia, Yemen, and Egypt, in addition to 9 official delegations.

Senior Officials of the Water Council Member States met in the presence of representatives of the OIC General Secretariat and the relevant OIC institutions namely: Islamic Development Bank (IsDB), Islamic Educational, Scientific and Cultural Organization (ISESCO), Islamic Organization for Security Statistical Center for Economic and Social Research and Training for Islamic Countries (SESRIC) as well as institutions attending as observers: Islamic Network for Water Resources Development and Management (INWRDAM) and International Center for Bio-saline Agriculture (ICBA).

The Bureau was unanimously elected during the meeting as follows:

- The Chairman: Egypt
- Vice Chairman: Saudi Arabia
- Vice Chairman: Senegal
- Rapporteur: OIC General Secretariat

The most important recommendations were as follows:

- OIC institutions and centers organize capacity building and training workshops, particularly in relation to the water monitoring network and early warning system; water supply and management in agriculture. Members of the Water Council are encouraged to announce the holding of such training workshops as well as FAO to avoid duplication.
- Based on the recommendations, Egypt was commended for organizing a training course for water young professionals in the OIC countries in the field of integrated water resources management in Cairo from (20-24) October 2019 to train 15 participants from 9 countries.
- Ensure better communication with various stakeholders and share innovative technologies and new mechanisms to address water-related issues adopted by the OIC countries.
- Reactivate the water resources portal to focus on success stories, case studies and other information on water related activities undertaken by Member States.
- Establishment of a special network of centers of excellence in the field of water in the Islamic world to share knowledge and experience.
- The OIC General Secretariat work closely with the Member States and other OIC institutions in order to convene the meeting of the Water Research Institutions in the OIC Member States.
- To overcome the shortage of technical and financial resources by several OIC Member States to develop water resources strategies, as well as collaborate in innovative research to enable different preventive measures, the OIC General Secretariat should engage with other regional and international stakeholders to establish institutional mechanisms for leveraging available funds, international best practices and capacity building opportunities for water professionals in OIC countries.

2.2 Ministerial Meeting of the Presidential Initiative for Infrastructure Development (PICI)

PICI Africa-wide Inter Ministerial Meeting was held under the chairmanship of HE Dr. Mohamed Abdel-Aty - Minister of Water Resources and Irrigation, in the presence of South Africa, Algeria, Nigeria, Niger, Namibia, Democratic Republic of Congo, Senegal, Sudan, Rwanda, AU/NEPAD and the African Development Bank.

NEPAD Executive Director emphasized the progress in some PICI projects such as the Trans-Saharan Highway (Algeria), the Railways (Senegal), the Navigational line between Lake Victoria and the Mediterranean Sea VICMED (Egypt), and the fiber optic project (Rwanda). Also, obstacles that interrupt implementation of some other projects have been highlighted.

The meeting made the following observations and recommendations:

- Sudan membership has been approved. In addition, Sudan has submitted a request to include the following projects under the umbrella of PICI:
    - Suakin seaport, which was previously presented during the previous ministerial meeting.
    - Dakar Railway - N'Djamena - Port Sudan.
    - Babanosa Railway - South Sudan.
- Abidjan-Lagos highway project has been enclosed under PICI, which was presented by Côte d'Ivoire at the technical working group meeting held in Abidjan.
- PCI express gratitude to Egypt for the successful organization of 5th PIDA Week in Cairo.
- Member States and stakeholders were invited to seriously consider reallocating additional resources (technical and financial) to PICI Secretariat to ensure that they fulfill their roles and responsibilities efficiently.
- Algeria will consider hosting the technical and ministerial working group meetings for 2020.

2.3 Egyptian-Dutch Water Management Advisory Panel Meeting

Within the framework of joint cooperation between Egypt and the Netherlands, a meeting of the Egyptian-Dutch Water Management Advisory Panel was held on October 23, 2019 in Cairo. The meeting considered as one of the important official event for Cairo Water Week 2019. The Egyptian and Dutch sides reviewed the most important studies and tasks that have taken place since the last meeting of the Council that was held in April 2019.

The most important conclusions and recommendations were formulated, which concluded as follows:

- The importance of supporting the use of an integrated approach in improving agricultural drainage systems, taking into account water quality issues, and the impact of the use of modern irrigation techniques on drainage and reuse systems. On the other hand, it is recommended to study the financing options for these projects at the local level. The panel is requested to support those proposed activities.
- Support the development of land registration systems in Egypt with the mapping of existing land to improve urban and rural water management. This activity will be more a direct cooperation between the Dutch Cadastre and the Egyptian Survey Authority of MWRI.
- New Egyptian-Dutch cooperation program be developed in harmony with the activities of the Egyptian-Dutch water Advisory panel, as well with the efforts of the international financial institutions working in the water sector in Egypt to achieve maximum harmony and maximize returns.
- Encouraging a move towards simple, nature-friendly solutions for the protection of beaches and integrated coastal zone management. The ECCADP – GCF project is taking important steps in that regard, EG-NL HLWP would play an important role in this regard based on Netherlands considerable expertise.
- Emphasize the importance of conducting environmental and social impact Assessment for projects and policies and welcoming the cooperation with the Dutch Commission for Environmental Assessment (NCEA) in supporting and building the capacity of the Staff of the Ministry of Water Resources (MWRI) in the water sector projects in cooperation with the Ministry of Environment. The Panel will follow up and support the future cooperation between MWRI and NCEA.
- Support flood early warning system and water quality monitoring through mobile applications to improve water management, support decision-making and raise public awareness.
- Involve Dutch Water Boards in some future activities of the Egyptian-Dutch water Advisory panel to exchange practical experiences with the Egyptian side.

2.4 High - Level Joint Technical Committee on Water and Agriculture at the Senior Official Level

The League of Arab States, in cooperation with the Food and Agriculture Organization (FAO), the Economic and Social Commission for Western Asia (ESCWA) and the Arab Organization for Agricultural Development, was organizing the first meeting of the High-Level Joint Committee on Water and Agriculture in the Arab Region during the period from 23-24 October 2019 under the title "Towards More Sustainable Water Resources Mechanisms". This is considered as the first step to implement the decisions of the Joint Ministerial Meeting of the Arab Ministerial Council for Water and Agriculture and the Cairo Declaration on the Coordination of Water and Food Security in the Arab region, held in Cairo, April 4, 2019.

The Joint High-level Committee presented as the executive arm of the Joint Arab Ministerial Council on Water and Agriculture, which aims to develop regional policies and programs to ensure coordination between the water and agriculture sectors, as well as the development of the Arab region. Priorities have been identified for the High Level Joint Committee work program for the next phase: Cross-cutting issues between the water and agriculture sectors and the follow-up mechanism for the implementation of the Cairo Declaration and the creation of mechanisms for the exchange of experiences between Arab countries and other regions. Experiences of water sector reform in Australia and the coherence of water and agricultural policies in Jordan were also presented.

The meetings made the following recommendations:

- Discussed the draft recommendations and agreement on what is submitted to the second joint ministerial meeting as follows:
    - Adoption of the terms of reference of the Technical Committee
    - Mandate the Technical Secretariat in coordination with FAO and ESCWA (partner organizations) to prepare a guide for water allocation in agriculture for the Arab countries.
- The adoption of cross-cutting axes in water and agriculture as follows:
    - Allocation (intended to allocate water to different sectors)
    - Water productivity
    - Water use efficiency
    - Use of non-conventional water resources in agriculture
    - Interdependence between water, energy and food security
    - Nominating two liaison officers, one water officer and another to agriculture from each Arab country
    - Inviting Arab water and agricultural experts to register in the database of the Arab Organization for Agricultural Development.

2.5 League of Arab States Meeting of the Restricted Committee on Guidelines for Cooperation on Shared Water between Arab Countries

Within the framework of activating the decisions of the Arab Ministerial Council for Water, the meeting of the restricted -committee on the guiding principles of Arab cooperation in the exploitation of shared water resources was held on Tuesday 22/10/2019. It is an intergovernmental meeting of high level representatives of three countries, Egypt, Kingdom of Saudi Arabia and Sudan. The meeting objective was to discuss the draft guidelines of cooperation between Arab countries on shared water. The meeting is a follow up on the decision of the Arab Water Ministerial Council and is supported by ESCWA.

This meeting followed the meeting held on 28/4/2019 in Cairo to discuss the remaining guidelines from Number 9 to 12 and agreed on their formulation. Another meeting for the committee will be held shortly before presenting the draft guidelines to the Ministerial Committee.

The meeting was attended by Dr. Hamou El-Omrani, representing the General Secretariat of the League of Arab States, Dr. Ziad Al-Khayat, representing ESCWA, and members of the Committee from the three countries (Egypt, Sudan and Saudi Arabia).

IMPORTANT ACTIVITIES

CHAPTER 3

ON THE SIDE OF THE WEEK

3.1 The Conference of Young Water Professional from African Countries

Based on the fruitful collaboration and coordination between the 1st Cairo Water Week and 1st AfYWP's Forum last year, the Ministry of Water Resources and Irrigation of Egypt (MWRI), ICID and AFRWG decided to continue the success and to organize the 2nd African Young Water Professionals Forum (2nd AfYWP-Forum) under the platform of the 2nd Cairo water week 2019.

The 2nd Af-YWP-Forum was held from 21 -23 October 2019 by the African Regional Working Group (AFRWG) of the International Committee on Irrigation and Drainage (ICID). The forum was supported by Ministry of Water Resources and Irrigation of Egypt (MWRI), International Commission on Irrigation (ICID), Economic and Social Commission for Western Asia (ESCWA), Islamic Development Bank (IsDB), Institute of Geographic Sciences and Natural Resources Research (IGSNRR) - Chinese Academy of Sciences, Ningbo Yaofeng (Chinese company), Zhong Guanshun (Chinese company) and as well as the Italian National Committees on Irrigation and Drainage. The aim was to create awareness among Young Professional's on water resources, irrigation and drainage challenges and capacity development to facilitate sharing of experiences between the Young Professional's (YP's) in water, irrigation and drainage related fields.

The Forum was mainly focusing into two themes those are climate change impacts on agricultural productivity and advanced irrigation technologies, with a delighted participation of 37 African future water leaders from 14 African countries including Egypt, Ethiopia, Chad, Ghana, Kenya, Malawi, Mauretania, Morocco, Nigeria, South Africa, Sudan, Tanzania, Tunisia, and Zambia.

During the three days, the YP's were trained in two important topics: the first is Climate Change Impacts on Agricultural Productivity, The second focused on the advanced Irrigation Technologies.

The forum ended with the following recommendations:

- There are obstacles that restrain the role of young professionals, such as the gap between the seniors and young professionals in the experience and the lack of knowledge transfer as one obstacle and the gap between the scientists and the policy makers when it comes to implementation of the innovative systems proposed by the young professionals.
- Youth – as the decision-makers of the future – are often marginalized as the immediate development needs of the present are oftentimes prioritized by politicians above the needs of future generations.
- There is a need to activate some platforms and to support the National committees of ICID in some African countries.
- A yearly evaluation for the contributions of the coordinators of the forum to be done and it is preferable to rotate coordination responsibilities among YPs.
- Owing to the success of the 2nd forum, all the great partners are invited as the main sponsors of Af-YWP-forum activities to continue their support to the 3rd African Forum which will be held back to back to the African Regional conference on Irrigation and drainage 16-19 March 2020, in Marrakesh, Morocco.
- All the YP's are invited to submit an abstract for the first African young professional workshop in the 5th African regional conference.

3.2 Forum for "Water Governance and Financing in the Water Sector"

In cooperation with the Union for the Mediterranean (UFM), the European Union organized a forum entitled "Water Governance and Financing in the Water Sector" to discuss the Mediterranean and Egyptian issues. This included the vision and plans of the Union for the Mediterranean for sustainable development as well as issues related to sustainable financing in the field of water infrastructure projects, with a major focus on the external investment plan of the EU, the European Fund for Sustainable Development and possible future cooperation between the EU and other funding alliances. During the two days (20 - 21 October 2019),the event was a technical follow-up to the UFM Ministerial Conference on Water held in Malta in 2018.

The topic of the first day was exchange views on how to ensure water security and adaptation to climate change in order to create a common understanding of the current situation and challenges related to adaptation to climate change in the region. The ongoing initiatives under the Union for the Mediterranean on climate change adaptation and mitigation were also reviewed. In addition, various options for attracting climate finance to enhance water security were discussed as well as the importance of promoting adaptive capacity-building and institutional frameworks. Emphasis was also placed on the challenges facing Egypt in the field of water resources management and efforts to deal with water scarcity through the implementation of various programs to improve irrigation water use efficiency, water reuse mechanisms, modern irrigation techniques and agricultural production that contribute to the expansion of Food security in Egypt.

The second day of the Forum aimed to build a constructive dialogue among participants on ways to achieve sustainable financing for the water sector in the Mediterranean region and possible actions to enhance the role of public-private partnerships in the water sector. Efforts by the Union for the Mediterranean (UFM) to support operational and innovative partnerships, including those with the private sector, were discussed with a view to supporting the implementation of the UFM Agenda.

The meetings made the following recommendations:

- The UFM and the EU should support countries in the preparation of feasibility studies and PPP projects at the national and regional levels.
- It is important to identify key governance and capacity-building challenges in creating a consensual regional water policy framework that provides a positive and measurable means towards sustainable development, taking into account the implementation of water management through legal and institutional measures.
- Urgent attention from all stakeholders and development partners is needed to unify efforts towards optimal water resource management and achieve sustainable development goals and the objectives for long-term stability.
- The need for active cooperation between regional and international institutions and organizations, national and local authorities, local communities and civil society, including the use of existing best practices and initiatives.
- Political will is vital to adapt to change, so governments must create an enabling environment to attract investors, rely on comprehensive strategies, and collaborate to turn challenges into opportunities at the national and regional levels.
- The private sector should share its expertise in service sustainability and long-term vision.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3.3 Workshop on Advanced Water Accounting and Training Methods for the Analysis of Water Accounting

Food and Agriculture Organization (FAO) in coordination with the Egyptian Ministry of Water Resources and Irrigation (MWRI) organized a regional training for the Near East and North Africa countries, which includes Egypt, Jordan, Palestine, Lebanon, Iran, Tunisia, Morocco and Algeria. The activity was part of project of implementing the 2030 Agenda for Water Efficiency / Productivity and Sustainability in MENA Region.

The training aimed to review the various tools used in the Water Accounting (WA) system and to study the methodology of the hydrological cycle and the current situation and future trends in both water supply and demand. This training targeted the analysts of water accounting teams and was the first in a series of training and workshops that will provide them with the tools necessary for their role.

Each country presented its study areas and how to apply the tools and data available in the preparation of water accounting reports. The Water Institute of the Netherlands (IHE) presented how to switch from initial water accounting to advanced water accounting and how to overcome the lack of data using satellite imagery and remote sensing. The training was followed by two days filed visit to Minya Governorate, which was selected as one of the study areas in Egypt to give the trainees a general idea about Minya Governorate and some details of the study site. The representative of the Egyptian Ministry of Agriculture presented the measures of the Ministry of Agriculture to deal with water scarcity, especially in Egypt, in addition to the agricultural plan of the Minya Governorate and the most important crop patterns.

The training included many activities, discussions, exchange of experiences between the participating countries and the presentation of different solutions and experiences to be disseminated among the working group and applied more widely to serve the general objectives of countries in the face of water scarcity in light of climate change.

3.4 The 70th Meeting of the World Water Council

The meeting of the Board of Governors of the World Water Council No. 70 was held on the sidelines of the Cairo Water Week in Cairo 2019. The meeting was attended by the Minister of Water Resources and Irrigation and Prof. Dr. Khaled Abdel Hay, President of the National Water Research Center as Governor for the World Water Council. The Governors then reviewed the most important water events they had participated in during the three months preceding the meeting.

Subsequently, working groups were formed to discuss water issues on the agenda of the World Water Council, as follows: Water Security-Integrated water resources management-Financing water projects-The impact of special changes on water sources.

At a later session, Mr. Patrick Lavard and Mr. Abdulla Sen reviewed the arrangements for the Ninth World Water Forum to be held in Dakar, Senegal from 22-27 March 2021 as members of the organizing committee of the Forum. And they gave a brief on the main themes of the forum that determined as follows:

- Water security and sanitation
- Cooperation in the field of water
- Development of rural areas
- Means and tools

3.5 Workshop on the Current Status of Higher Education, Water, Research and Training - Water Excellence Center

The workshop was organized in cooperation with a number of prestigious Egyptian and international universities. The workshop was organized by the American University in Cairo (AUC), Alexandria University, Ain Shams University, Beni Suef University, Zagazig University, Aswan University, Temple University, Utah State University, University of California, Washington State University.

The Water Excellence Center aims to support Egyptian higher education, research and training in water science and engineering. From its inception, the center's partners (more than 20 partners from the government, universities, research centers, the private sector and institutions) have been studying the current situation and the capabilities of Egyptian institutions of higher education and scientific research.

The results of the in-depth assessment of the needs of Egyptian higher education and scientific research institutions were presented.

The workshop was divided into two main sections: the current situation of higher education (research and training, challenges related to the Egyptian water strategy within the Egyptian strategy for sustainable development) and ways to move forward to meet such challenges and eliminate gaps.

3.6 Water Children Forum and STEM School Students

Food and Agriculture Organization (FAO) in coordination with the Egyptian Ministry of Water Resources and Irrigation (MWRI) organized a regional training for the Near East and North Africa countries, which includes Egypt, Jordan, Palestine, Lebanon, Iran, Tunisia, Morocco and Algeria. The activity was part of project of implementing the 2030 Agenda for Water Efficiency / Productivity and Sustainability in MENA Region.

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The training included many activities, discussions, exchange of experiences between the participating countries and the presentation of different solutions and experiences to be disseminated among the working group and applied more widely to serve the general objectives of countries in the face of water scarcity in light of climate change.

3.7 The 20th Meeting of the Joint Authority for the Study and Development of the Nubian Sandstone Aquifer System (NSAS-JA, NWRC)

The Joint Authority for the Study and Development of the Nubian Sandstone Aquifer System (NSAS-JA) held its 20th Ordinary meeting on 24 October 2019. The meeting was held under the Chairmanship of Eng. / Soliman Saleh Al-Barouny (Head of the Libyan Party), and attended by Board members of the member countries (Egypt – Libya – Chad – Sudan).

As a follow-up to the decisions taken during the 19th Joint Authority's Board meeting held on June 12-13, 2019, it is recommended to:

- The need to speed up the electing persons in charge of the operation of the NARIS information exchange system in each member state and to start preparing a proposal for their training course.
- Assigning the Executive Director to prepare a proposal for the materials to be amended in the Authority's regulations.
- Activating the role of the technical committee formed by the Board of Directors of the Authority during the past years and benefiting from its experience during the upcoming meetings.
- At the end of the meeting, it was agreed that the presidency of the Joint Authority would be transferred to Egypt headed by Prof. Khaled Abdel Hay Ramadan, Head of the Egyptian side. It was also agreed that the upcoming meeting would be held in Chad on June 2020.

3.8 Other Activities on the Sidelines of the Week

3.8.1 Journalists' Fellowship

The Cairo Water Week Journalists' Fellowship aimed to build capacity on water-related issues among journalists that are active in developing countries to raise awareness among a large audience of listeners and viewers. The grant allowed journalists from low-income countries to visit Cairo and report on the week. Thirty one journalists had applied for the grant. Four journalists (from African countries) were selected.

3.8.2 Graduation Projects Competition

A competition for graduation projects was held for all public and private universities to select the best graduation projects for the academic year 2018/2019, whose projects discuss one of the fields of competition: irrigation, hydraulics, water management, coastal management and water desalination.

The Scientific Committee of Cairo Water Week identified the best three graduation projects and provided the opportunity for the winners to present their work in a special technical session during the Cairo Water Week:

- Menoufia University Project entitled "Automatic control system in greenhouses cultivation based on hydroponics technology". The objective of this project was to design and develop an automatic greenhouse control system, which is an essential component of food security. Greenhouses rely on hydroponics technology, where plants grow without using soil.
- Ain Shams University Project entitled "Integrated water projects for the development of water-scarce areas (coastal Shalatin, Egypt)." The project was the development of infrastructure in Shalatin (e.g. desalination plant, fishing ports and solar power plants).
- Zewail University Project entitled "Domestic water treatment unit for shallow groundwater in the Delta". The project aimed to find low-cost engineering solutions for the operation of a water treatment unit suitable for use at the home level through basic treatment of shallow groundwater used in the Nile Delta of Egypt.

3.8.3 Competition for Best Practices on Water Saving

The competition for best practices on water saving within the National Competition for Water Conservation. It was launched by the Egyptian Ministry of Water Resources and Irrigation and organized by the Planning Sector within the activities of the campaign to rationalize water consumption and preserve it from waste, pollution and encroachments and in cooperation with the European Union in order to assess the outstanding practices of private Water users' associations on the irrigation canals.

The competition was evaluated by a specialized jury for all outstanding practices in the field of rationalization in various fields such as (lining irrigation canals - maintenance work of pump stations - the application of modern irrigation systems - sprinkler irrigation - drip irrigation for different areas - the application of water-saving agriculture methods – extraction of water-saving varieties) from all the different governorates of Egypt.

The committee discussed all the presentations and focused on the four important axes: Continuity-Water conservation-Cost-Return on productivity.

The final selection of the farmers participating in the national competition for the best practices of rationalization of water consumption was reviewed and the best practices that got first place in some technical sessions were reviewed in Cairo Water Week 2019 to show and share the experiences of the farmers and their statement as follows:

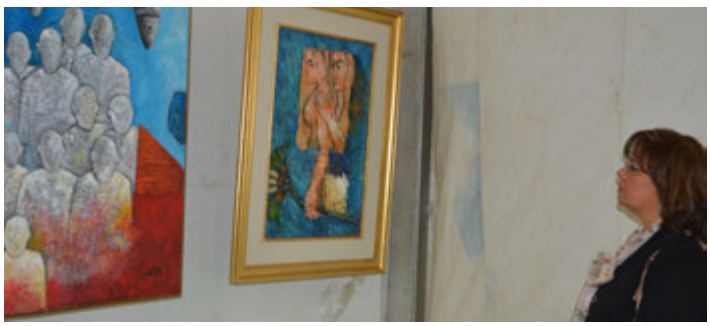
- Mr. Mohamed Ali Salem - Gharbia Governorate
- Mr. Safi Abdel Salam - Giza Governorate
- Mr. Mohamed Abdel Shakour - Minia Governorate
- Mr. Awad Mahmoud - Fayoum Governorate
- Mr. Mosaad Sayed - Giza Governorate

3.8.4 Exhibition for Water and Desalination Technologies

Adequate numbers of distinguished exhibitors have been organized in different pavilions from private companies, international organizations and Egyptian ministries. It is worth mentioning that the exhibition was a unique opportunity for public and private institutions working in the water sector to review and present their activities, programs and products and presenting modern ideas and advanced technology in the fields related to water. It also provided the opportunity to build a wide network of relationships with businessmen and investors to interact with a broad target audience.

3.8.5 Fine Arts Exhibition

The Fine Arts Exhibition, organized by the Salsabil Nile Initiative in collaboration with the Ministry of Water Resources and Irrigation, was opened with the aim of bringing together distinguished artists who promote the trend of contemporary expression and linking this sophisticated art to water-related topics.



THE PLENARY SESSIONS

CHAPTER 4

OF THE FIVE THEMES OF THE WEEK

The Cairo Water Week 2019 was distinguished by the scientific, technical and research content that featured (5) public sessions and (45) technical sessions specialized in water resources research and management and scientific and technological ways to manage water. Here is the summary of the most important sessions .

4.1 Opening Session

Opening Session chaired by H.E. Prime Minister Dr. Mostafa Madbouly in the presence of a number of prominent personalities and international organizations

The ceremony was inaugurated by welcoming the distinguished participants in the field of water, where speeches were made to clarify the importance of this event to discuss the most prominent water-related issues in the Middle East, including Major General Karam Salem, President of the National Projects Company, where he presented the major projects in Egypt to face the future challenges. .

This was followed by a speech by Mr. Serine Mbaye Thiam, Honorary president for the World Water Council and the Minister of Water and Sanitation of the Republic of Senegal, which will organize the 9th World Water Forum "Dakar 2021".

He stressed the importance of the political vision in water management and that the continuation of dialogue on the Nile water between the riparian countries is indispensable.

H.E. Abdessalam Ould Ahmed, Assistant Director-General of FAO and Regional Representative for the Near East and North Africa, said: "Water is the cornerstone of achieving the Sustainable Development Goals and the future will be shaped by our water management."

Mr. Masig Popovsky, General Coordinator of the European Neighborhood Commission at the EU Commission, congratulated Egypt on the organization of this important event and noted that this week is an important event that attracted the attention of the whole world. He stressed that the water sector is a top priority for the EU.

Dr. Mohamed Abdel Aty, Minister of Water Resources and Irrigation of the Arab Republic of Egypt, delivered a speech in which he stressed that Egypt faces serious challenges in terms of water scarcity resulting from increasing water demand and limited water resources and that the water resources management system in Egypt includes reusing of treated agricultural drainage/domestic wastewater on a large scale to bridge the gap between water resources and demands.

At the end of his speech, he stressed the importance of concerted efforts in the face of water scarcity and the potential opportunities that must be taken into account to achieve sustainable development and prosperity for Egyptians and all citizens in the Middle East and Africa.

In conclusion, Dr. Mostafa Madbouly, Prime Minister of the Arab Republic of Egypt, delivered a speech welcoming all attendees. He also mentioned that Cairo Water Week is an excellent platform for exchanging knowledge and creating closer relations between water organizations. He thanked the participating delegations from all over the world and encouraged them to exchange knowledge and experiences during the week.

Ministers, senior officials and water experts from more than 100 countries attended the opening ceremony.





4.2 Plenary Session "Achieving Sustainable Development under Water Scarcity"

Conveners: The Egyptian Ministry of Water Resources & Irrigation

Moderator: Dr. Pasquale Steduto, Chief of the Water Resources, Development and Management Service (FAO)

Keynote Speaker: Dr. Pasquale Steduto, Chief of the Water Resources, Development and Management Service (FAO)

Panelists:

- H.E. Dr. Bianca Nijhof, Director of the Netherlands Water Partnership, Board Member of the Amsterdam International Water Week, the Netherlands.
- Eng. Yousef El Aytan, ASG for Water Operation & Governorates Affairs/Water Authority of Jordan
- H.E. Mohamed Bin Jarsh Al Falasi, Undersecretary of the Abu Dhabi Department of Energy (DoE).
- Mr. Manuel Sapiano, Chief Executive Officer at the Energy and Water Agency, Malta
- Dr. Felix Reinders, President of the International Commission on Irrigation and Drainage (ICID).
- Eng. Aly Abousabaa, Director General, the International Center for Agricultural Research in the Dry Areas (ICARDA).
- H.E. Dr. Mohamed Abd-El Aty , Minister of Water Resources and Irrigation, Egypt.

Discussion Topics

The session addressed the strong water-related linkages across all of the SDGs, as well as the enormous challenge that water scarcity poses in the achievement of the SDGs and more broadly the session also covered the Agenda as a whole. The session also discussed the 'measures' that need to be implemented, or to be enforced, in order to accelerate the achievement of the SDGs under these particularly constraining conditions. It was also a good opportunity to present different practices and interventions implemented at the national level to face the challenges related to water scarcity.

Recommendations

- There is an urgent need to strengthen the regional water cooperation and shared water resources management in order to achieve water security and SDG 6.
- There is a need to strengthen institutional capacity to ensure sustainability and dissemination of introduced innovations
- Investment in innovative policies and practices is crucial as research, and technology development and transfer would enable further improvements in water resources management, water use efficiency and crop productivity.
- Public-private partnership (PPP) is a form of management in which the government teams up with a private sector to deliver public goods and services. PPP became one of the pillars of the reforms in the management of water sector. The renewed potential for infrastructure development offered by Public-private partnerships has spawned myriad initiatives by multilateral and bilateral donors to encourage and enhance private participation through technical assistance and capacity building.

4.3 Plenary Session "Cooperation in the Water Sector"

Conveners: The Egyptian Ministry of Water Resources & Irrigation

Moderator: Prof. Dr. Hani Sweliem

Keynote Speaker:

- H.E. Mr. Brahim H'Meyade, High Commissioner adjoint Organisation pour la mise en valeur du fleuve Senegal (OMVS), Mauritania
- Prof. Dr. Hesham Bekhit, department of irrigation Engineering and hydraulics, Egypt
- Dr. Eric Tardieu , Executive Director of IO Water, France
- Dr. Eelco Van Beek, Professor and Water Resources Specialist, Deltares, Netherlands

Discussion Topics

The session highlighted some UN indicators related to inter-state basins and how to find a mechanism for cooperation between countries with different interests. The Eastern Nile Basin was presented as an example of managing challenges in shared rivers. The session also dealt with the negative effects of the construction of the Ethiopian Renaissance Dam on Egypt and a comparison between the Egyptian proposal and the Ethiopian proposal regarding the filling and operation of the Renaissance Dam. On the other hand, the session highlighted the laws governing water globally, especially the laws relating to the treatment of shared basins. In the second part of the session, some experiments were presented to the management of water resources for a group of shared basins. An experiment from Senegal and France was presented as two successful experiments in this field.

Recommendations

- Countries sharing transboundary freshwater resources should adhere to the international water law principles of equitable use, no significant harm, and prior consultation while planning and constructing large-scale hydraulic projects.
- Egypt water resources should be developed to deal with possible future water shortage.
- Egypt, Sudan and Ethiopia have to develop their water resources for the benefit of their people based on the principle of equitable use.
- Serious negotiations between Egypt, Sudan, and Ethiopia should continue to solve the water conflict between them and a win–win strategy should be applied to defuse tensions between Egypt and Ethiopia over the GERD.
- Ethiopia should reach a fair agreement with Egypt and Sudan on the capacity of the GERD reservoir, rules for impounding the GERD reservoir as well as the operating rules.
- There is an urgent need to encourage joint management of transboundary river basins and aquifers.

4.4 Plenary Session "Research and Innovation in the Face of Water Scarcity"

Conveners: The Egyptian Ministry of Water Resources & Irrigation

Session Officers: ???

Moderator: Hesham El Askry, Professor of Remote Sensing and Earth System Science, Schmid College of Science and Technology, USA

Keynote Speakers:

-Dr. Daniel J. Howes, Project Manager, irrigation training and Research center, California polytechnic state university, USA:

- Prof. Dr. Mohamed Bayoumi Zahran, Cahirman of National Authority of Remote Sensing and Space Sciences, NARSS: Space Technology, Remote Sensing and GIS Impacts on Smart Water Resources Management.

- Dr. Thomas Piechota, Vice President for Research, Professor of Environmental Science and Policy, Schmid College of Science and Technology, USA: Water Supply forecasting Innovation using Climate Indicators.

- Prof. Hesham El Askary, Schmid College of Science and Technology, USA: Advances in Earth Observations and Data Science Addressing Water Scarcity.

- Dr. Giovanni del Santi, Director, JRC institute, Italy: Interconnect Science and European Union Policies To Ensure Water , Energy and Food Security.

- Dr. Ayman El-Sayed, Head of Monitoring, communication, information, and assets sector, MWRI, Egypt: role of Information and Communication Technology (ICT) Research and Innovation for Smart Water Resources Management.

- Dr. Elga Salvador, Lecturer and Water Accounting Expert, Delft IHE for water education, The Netherlands: Adding the Access Dimension to Water Scarcity Problem.

Panelists:

- Dr. Giovanni del santi, Director , JRC Institute, Italy
- Dr. Ayman El-Sayed, Head of Monitoring, communication, information, and assets sector, MWRI, Egypt
- Dr. Elga Salvador, Lecturer and Water Accounting Expert, Delft IHE for water education, The Netherlands.
- Dr. Thomas Piechota, Vice President for Research, Professor of Environmental Science and Policy, Schmid College of Science and Technology, USA
- Dr. Daniel J. Howes, Project Manager, irrigation training and Research center, California polytechnic state university, USA
- Prof. Dr. Mohamed Bayoumi Zahran, Chairman of National Authority of Remote Sensing and Space Sciences, NARSS

Discussion Topics

The session dealt with several topics including the importance role of research and innovation in providing solutions and tools to adapt to future climate changes facing the world, including water scarcity. In addition, the latest applications of scientific and technological innovations in water management were presented to help countries meet water challenges and ensure sustainable development. The participants indicated that the water security cannot be guaranteed by having high-quality infrastructure only, but also require better governance at regional, national and local levels, legal and policy frameworks, effective water resources management, stakeholder participation at various scales as well as water service delivery models among others. In this context, the session valued the role of innovation, research and technology in addressing the water challenges being faced in the water scarce regions, and the overall realization of SDGs.

Recommendations

- Provide a spatial baseline analysis and projection of the inter-connected water, energy and food requirements and their associated impacts in the Mediterranean and Africa.
- Research and innovation should achieve safe access to water, easy access to data and information, easy access to knowledge and technology.
- Satellite data should be used in conjunction with ground observations and models to improve spatial resolution and achieve better physical understanding.

4.5 Plenary Session "Impacts of Climate Change, Response and Adaptation"

Conveners: The Egyptian Ministry of Water Resources & Irrigation

Session Officers: ???

Moderator: Dr. Mohamed Ahmed

Keynote Speakers: Dr. Mohamed Ahmed

Panelists:

- Dr. Ragab Ragab, Principal Hydrologist & Water Resources Management Specialist, Centre for Ecology and Hydrology, CEH, UK
- Dr. Charafat Afailal, Former Minister in Charge of Water, Morocco
- H.E. Dr. Henk Ovink, Special Envoy for International Water Affairs for the Kingdom of the Netherlands, The Netherlands
- Dr. Johannes Cullmann, Director, Climate and Water WMO, German
- Mr. Rémi Touron, Agence de l'eau Rhône Méditerranée Corse, France
- Mr. Aris P. Georgakakos, Director of the Georgia Water Resources Institute, Georgia Tech, USA

Discussion Topics

The session focused on two key questions: "How climate change will affect the water cycle, and what are the main mitigation and adaptation strategies to reduce environmental risks." The experts discussed the effects of climate change, such as the effects on limited water resources, land-logging in coastal areas and declining agricultural productivity as a result of rising water levels. A number of successful experiences on how to adapt to climate change were also presented from England, France, Morocco and the Netherlands.

Recommendations

- It is noted that temperatures are expected to increase by one degree to two degrees until 2049 and increase by 3 to 4 degrees until 2089 unlike other models expect to increase up to 7 degrees until 2089
- Why are forecasts of the impact of climate change being made in Egypt and Sudan only? These models are not applied on Ethiopia. This is because no data available about Ethiopia or what? The data only at the farmers.
- It should be one standard technology or model for all countries with fixed accuracy for forecasting.
- The weather in Egypt and Ethiopia is good what about the weather in Sudan.

4.6 Plenary Session "Utilization of Non-Conventional Water Resources under Water Scarcity"

Conveners: The Egyptian Ministry of Water Resources & Irrigation

Co-convener: Faculty of engineering, Cairo University

Session Officers:??

Moderator: Prof. Alaa El-Zawahry, Professor of Water Resources and Environmental Engineering, Faculty of Engineering, Cairo University

Keynote Speakers:

- Prof. Alaa El-Zawahry , Professor of Water Resources and Environmental Engineering, Faculty of Engineering, Cairo University

Panelists:

- H. E. Eng. Mazen Ghunaim: Head of the Palestinian Water Authority
- Prof. Yaohu Kang: Professor: Institute of Geographical Sciences and Natural Resource Research, Chinese Academy of Sciences (CAS), Beijing-China
- Prof. Redouane Choukr-Allah: Head of the salinity and plant nutrition laboratory, Professor at the Institute of Agronomy and Veterinary Hassan II, Morocco
- Prof. Dr. Ir. Jules B. van Lier: Professor Wastewater Treatment / Environmental Engineering and head of the Section Sanitary Engineering of Delft University of Technology
- Eng. Laura Tanco Ballesteros: Civil engineer at the Hydrological Planning Office, in the Jucar River Basin Authority since 2009.
- Dr. Moahmmed Hassan Mohammed, Ministry of Housing, Utilities and Urban Communities, Egypt.

Discussion Topics

During the session, modern technologies for the exploitation of non-conventional water resources such as reuse of treated water and desalination were discussed in light of the increasing demand for water in many countries of the region. The attendees discussed the need to study the environmental, health and other factors affecting treatment technologies during the use of these resources and the energy used. Although they are a good alternative to water resources, they also include many challenges where the choice of non-conventional resources requires appropriate planning and organization in addition to the need to provide investment and good control and building administrative capacity and mitigate the negative effects resulting from it.

Recommendations

- It is important to improve the enabling environment for the non-conventional water resources development and operation through the following topics:
- Low cost wastewater treatment & utilization
- Role of non-conventional water in water scarce environment
- The latest in desalination technologies and development.
- Economic use of brackish water for agriculture and aquaculture
- Nature based methods for polluted drainage water treatment
- Recycling and reuse of treated wastewater and agricultural drainage water.
- Change law 48/1982 for drainage discharge of treated sewage (Relax on COD criterion).
- Primary treatment of sewage for entire Delta area
- Temperature ideal for anaerobic stabilization
- Scrutinize selection criteria for (secondary) treatment plants
- Novel technologies are promising (Nereda, Ubox, other) for discharge to sensitive surface waters.

4.7 Closing Session Activities

- Cairo Water Week 2019 had a concluding session which included a singing performance for children and then Dr. Eman Sayed, Head of the Planning Sector at the Egyptian Ministry of Water Resources and Irrigation, presented the harvest of the five consecutive days in the following points:

  o The event included the organization of dozens of forums, workshops and public and specialized sessions in the presence of many experts, scientists, ministers, ambassadors and concerned with water affairs at the international, regional and national level.

  o The Week was honored to be under the patronage of the President Abdel Fattah El-Sisi - President of the Arab Republic of Egypt and honored by the inauguration of the Prime Minister Dr. Mostafa Madbouly for its activities, where he stressed on the concerns of Egypt and its current plans that put the axis of water and its preservation on the first priorities.

  o The week included the organization of workshops involving more than 45 international, regional and national organizations and more than 70 international speakers with the participation of 100 countries in this global forum and more than 1300 participants worldwide.

- In his speech, Ivan Surkosh, the EU Ambassador to Cairo, congratulated the Egyptian government and the Ministry of Water Resources and Irrigation on the good organization of the Cairo Water Week 2019, and said that the EU has always provided and will support Egypt in all fields, especially the water issue.

He also added that improving the quality of water management is a protection of the rights and security of present and future generations.

- Dr. Mohamed Abdel Aty honored the winners of the graduation projects competitions for university students and the competition for the best presentation of scientific research and the best competition for applied research. The Farmers' Competition, STEM School Students, and the Children's Forum. He also honored a number of senior hydrologists and members of the Scientific Committee for the week.

- Finally, Dr. Mohamed Abdel Aty thanked the H.E. the President of the Republic and the H.E. the Prime Minister for their full support, as well as all the state bodies involved in the success of the event, as well as the various organs of the MWRI, which continue to work over a year to produce this global event.

TECHNICAL SESSIONS BRIEFS

CHAPTER 5

Cairo Water week has the privilege of hosting more than 30 International Water Scientist and more than 150 featured scientists and experts, sharing their knowledge and ideas. Five plenary sessions for each theme were organized in collaboration with top water experts. Moreover, more than fifteen technical sessions were held including featured scientists, experts and speakers from all over the world. The following sections present a brief summary for the technical sessions carried out within the CWW 2019 .

5.1 Observation, Monitoring and Assessment of SDGs (TS32)

The session gave an assessment of irrigation performance in terms of adequacy, efficiency, dependability, and equity after implementing irrigation improvement projects in areas with high intensity paddy cultivation in Northern Nile Delta and investigate different scenarios for better groundwater management to optimize the capabilities of power-plants through identifying the importance of improving accessibility to existing data through an innovative earth observation model for monitoring the SDGs

Main Outcomes:-

- Assessing the current situation/practice by the farming community and their response and adaptation towards the water crisis under paddy cultivation (peak water demand)
- Stakeholders should support water-efficient practices proposed for building construction and operation, reducing both long-term water usage and costs.
- The water inventory databases should be extended and adjusted to the properties of the related industries in Egypt

5.2 Climate Change Impact and Adaptation in the Water Sector (TS 42)

The session highlighted the impact of climate change on ecosystem services and environment and present a case study regarding the role of regional institutions to support the countries efforts to adapt to climate change (The Nile Basin Regional Hydromet System) through identify challenges of data sharing and its impact on sustainable development and investigate uncertainty in climate change and future predictions of water resources availability by presenting the impacts of Climate change in achieving the agenda of SDGs and present case studies of climate change impacts, aspects and adaptation in a national level.

Main Outcomes:-

- The importance of sharing data on the national and regional level to help the decisions support systems for sustainable development plans.
- Identifying Climate change adaptation frameworks with in the participation of all stakeholders' communities.
- Taking into consideration the adaptation of climate change and its economic, social and environment aspects in managing water resources.
- The need for implement actions that enhance adaptation to the already changing climate in addition to act to mitigate further global temperature rise.

5.3 The Household Water Insecurity Experiences Scale: A Simple Questionnaire for Generating High-resolution Data on Water Security (TS 44)

This session identified the development of the Household Water Insecurity Experiences Scale (HWISE); illustrated how measuring household water insecurity can help track progress towards a number of SDGs, and what implementation in 30+ countries to date has revealed. The session concluded with a brief hands-on learning lab in which participants are trained on the use and analysis of the HWISE Scale.

Main Outcomes:-

- Addressing water insecurity is very important in its own right, and has its own SDG, SDG6, it can also help us to address other SDGs, including zero hunger, good health and wellbeing, gender equality, reduced inequality, sustainable cities, communities and climate action

5.4 Supporting Smallholders for Resilient Food Security System (TS 47)

The session highlighted the reasons for smallholders in rural communities in Upper Egypt, with the heavy reliance on the meager income they produce from fragmented areas of land, in addition to presenting what the Ministry of Agriculture and Land Reclamation has done in partnership with the World Food Programme to support these smallholders by increase their production, and thus income, and enhance the efficiency of managing their water and land resources.

Main Outcomes:-

- The importance of Transferring the technology for adaptation to climate change
- Strengthen institutional capacity to ensure sustainability and dissemination of introduced innovations.
- Up-scaling is one of major challenges in dissemination of new technology that could be addressed with comprehensive community mobilization and true collaboration between all involved stakeholders in the targeted communities.
- The importance of discussing the maximization and enhance investment for food security and rural development in the first national e-commerce platform.

5.5 Supporting Sustainable Water Management in Newly Reclaimed Areas (TS04)

The session highlighted potentiality of irrigation modernization in newly reclaimed areas and the future of groundwater management (quantity and quality) with in the role of new tools, e.g. modeling and decision support systems in enhancing sustainability of groundwater resources and approaches to match between water availability and demand in newly reclaimed areas.

Main Outcomes:-

- The need to better manage groundwater through more participatory and efficient approaches.
- The importance of enhancing water use efficiency and increase water productivity within the sustainable limits of groundwater resources.
- To highlight the risk to farmer's personal investments that may be happen if irrigation practices mimic those practiced in the delta region under surface irrigation water systems.
- The need to train farmers so as to make informed decisions on water saving techniques and the associated risks.

5.6 Water Productivity as the Cornerstone of Water-Limited Food Production (TS08)

The session explored the concept of water productivity (WP) the ratio of crop yield (biophysical WP) or income (economic WP) to consumed water (Evapotranspiration, ET). It was also mentioned that no-where in the Planet water scarcity is more acute than in the Near East-North Africa (NENA) Region. However, this is also a region with a long history of managing water for food production and human development. The region's civilization benefitted from the capacity to control water, store it and use it when the crop needs it the most (irrigation).

Main Outcomes:-

- Create more Opportunities to increase WP at farm and community levels
- Sustainability of irrigated agriculture should be grounded in diversity
- The Need for enhancing more integrated strategies and Investments in agriculture in the field of development of land and water resources
- Raising awareness and empower water users (inform the seriousness of water scarcity)
- Introducing appropriate policies to improve water governance
- Designing incentives and instruments to improve water productivity and reduce water wastage
- Reforming water and land policies to improve investments in land and water resources.

5.7 Networks for Capacity Development and Knowledge Sharing Tools to Cope with Water Scarcity (NBCNC) (TS09)

This session explored the role of different existing knowledge networks working in technical knowledge production and collaborative research activities in solving transboundary water related problems such as water scarcity. The session also highlighted the important role of water diplomacy and youth networks programs in bringing innovative dimensions for transboundary cooperation. The focus was on the engagement of all stakeholders for achieving better cooperation and benefits with presenting case studies from the Nile basin.

Main Outcomes:-

- The need for exploring more opportunities to learn about multidisciplinary approaches and joint programs of knowledge sharing and partnerships supporting capacity development.

5.8 Water Management for Sustainable Development (TS21)

The session included an investigation for the results within model simulations of 4 expected scenarios of reduced supply to Egypt, with reductions of 2.5 BCM, 4.5 BCM, 7.5 BCM and 10 BCM; investigating fertilizer drawn forward osmosis process and draw solution selection for desalination in Egypt in addition to highlighting the best practices and lesson learnt from Asian cities and other countries to create" SMART" Nexus cities and giving suggestions for policies to be formed and urban practices to be mainstreamed and to enhance securing its (Water –Energy – Food) resources.

Main Outcomes:-

- The importance of futuristic studies for reductions including climate change, developments upstream, and the natural regime of Nile flow.
- Reuse of drainage water could be increased on the condition that the water quality in the drains is improved
- Identifying the uses of Fertilizer Drawn Forward Osmosis (FDFO) as one of the promising desalination technique to treat underground brackish water with a minimal energy requirement
- Need for presenting the use of innovative cross sectorial and environmentally friendly technologies within the framework of Circular Economy to create resilient cities.

5.9 Water Accounting for Enhanced Water Productivity and Drought Management (TS22)

The session discussed the role of water accounting frameworks , techniques and their use in water resource planning through creating a policy dialogue platform to discuss key strategic issues in water resource planning and development under normal and drought conditions with in different examples from the world with a particular focus on the MENA region.

Main Outcomes:-

- The need for enhancing the Water accounting applications in water resource planning and management
- The importance of Water accounting and drought management in polices development.

5.10 Netherlands– Egypt Cooperation: From Policy Dialogue to Innovative Projects: recent developments in NL-EG Cooperation in the Water Sector (TS11)

The session highlighted the recent developments in EG-NL cooperation in the water sector, The Egypt - Netherlands Water Panel provides a platform for both policy dialogue and formulation of innovative projects. Also, to discuss the large-scale drainage implementation program to protect the cultivated lands from water-logging, soil salinity, as well as land and Water Management for the development of both countries (Egypt & Netherlands) which have some problems in common, in addition to discuss the Egyptian- Dutch cooperation areas such as capacity Building, water quality and environmental aspects, climate change and coastal zone management, etc.

Main Outcomes:-

- Private sector evolvement has to be done to overcome the financial problem .
- Training capacity building for farmer in saline farming.
- Enabling Environment is a key element for the success of future development projects.
- Public Private Partnerships for water resources projects is the future of collaborative projects and sustainable developments.
- Dialogue between the different parties can be the future way to innovative projects

5.11 Innovative Solutions to Improve Agricultural Production in Marginal Environments (TS 14)

This session reviewed the current practices in identifying strengths and weaknesses that help for develop future directions on SPIS in Egypt and Tunisia. In mitigating the risks associated with the expansion of groundwater irrigation resulting from the availability of subsidized renewable energy sources, data availability and the analytical capacity of concerned institutions become a central element of groundwater management. Moreover, the concept of solar powered irrigation systems need to be discussed within the overall socio-economic and political setting, where, the national policies on renewable energy, financial and economic incentives as well as the engagement of the private sector become pivotal in the future direction and development of solar energy use for agriculture.

Main Outcomes:-

- Role of real time monitoring helping decision maker
- Role of private sector in expanding the usage of solar energy
- Importance of using solar power in irrigation to limit over pumping and enhancing the underground aquifer characteristics

5.12 Non-Conventional Water Resources (TS15)

This session highlighted the use of Non-Conventional Water as a main strategic choice to fulfill the gap between water resources availability and water demand. Treated drainage water, rainfall harvesting and, desalination of seawater and brackish water are examples of such non-conventional water resources. The use of non-conventional water is on the top of research priorities of the NWRC to maximize the efficiency of such resources due to exponential increase in population and so the ambitious development plans in many countries in the region, the available fresh water resources are not satisfying the water demands.

Main Outcomes:-

- Need to increasing the capacity of reuse of drainage water is a non-conventional source of water which covers a huge part of the gab Egypt is suffering in the water balance and.
- The importance of Using the wet land technology as an innovational and environmental friendly practice way to treat drainage water
- Desalination is an important source of water to cover the gab Egypt is suffering but only in the drinking water
- Recharge the aquifer in the desert and remote area beneath it with the rain water and the flash flood rain which is called rain harvesting, provide the natives with source of water to use not only as drinking water but also to cultivate more crops and enabled construct and cultivate in green houses.

5.13 Count and account for scarce water: Build a sustainable water future (sharing country water accounting experience) (TS17)

This session raised awareness on the feasibility of using water accounting for planning, and reporting in the NENA water-scarce region and its usefulness to inform the sustainable development needs. Various countries in the NENA region started implementing 'rapid water accounting' as a first step in their aim to use standardized approaches but tailor them to their realities. The session took a closer look at the state of art developments on Water Accounting in the region while illustrating it with concrete examples from countries. The discussion highlighted the most common issues (data, tools, scaling up) and the approach to address them.

Main Outcomes:-

- Water Accounting (tailored, integrated, detailed, standardized) you need to make your own tailored.
- Data need to be institutionalized and share data between institution
- The importance of empower the water managers and users in IWRM.

5.14 The Role of Media in Raising Public Awareness for Better Water Use in Egypt (TS 18)

The session highlighted the challenges facing Egypt in Water Sector with in achieving the SDGs; identify different criteria for awareness campaigns through setting a national water communication strategy shared among all relevant ministries and catalyze and promote the use of advanced water technology and innovation practices in the management, restoration and sustainability of our valuable water resources.

Main Outcomes:-

- Explores the water Scarcity in Egypt and its aspects and highlighted the future agenda for sustainability of valuable water resources.
- Highlighted the different challenges by population growth, pollution, aging water infrastructure, and climate change are affecting our scarce water resources.
- The importance rising awareness as a key to face future's challenges in water sector.

5.15 Research and Innovation in Water Resources (TS19)

The session explored different solutions to produce biogas from the aquatic weeds and water hyacinth in an efficient technique, which successfully implemented in Uganda by presenting different Case studies with detailed data and information were provided with lessons learned from different experiments.

Main Outcomes:-

- Applying bio-grouting technique using an Egyptian bacterial strain for geotechnical engineering applications. That's enhance stability of earth dams, Increase the bearing capacity of foundations, control erosion of banks and coastal areas, increase slope and excavation stability, reduce soil potential for liquefaction, control of seepage.
- Converting Water Weeds to Bio-gas and Fertilizer prevent blocking the Watercourses and altering water quality and quantity, also prevent increasing Water Losses. Burning weeds causes medical problems.
- Developing a low-cost and labor-saving Early Warning Framework (EWF) for water quality monitoring of the Nile River based on the Internet of Things (IOT), for continuous on-line water quality monitoring with efficient time.
- The new small GRB gate is suitable to resist exposed loads. It has longer life time from 50-70 years and doesn't need major maintenance. No rust & less cost compared to steel gates (50-60%) , and doesn't pollute water (GRP used in drinking water pipes).

5.16 Role of Space Technology in Water Management (TS35)

The session highlighted the role of remote sensing techniques in improving water resources management by presenting different case studies from countries such as the role of open-access WaPOR database providing continuous and unbiased data on water and crop production in increasing agricultural water productivity and efficiency in Egypt and using of spectral satellite imagery in detecting water losses in urban freshwater distribution network in Gulf Countries...etc.

Main Outcomes:-

- Identify the vital role of Space Technology in order to support the operational decision pertaining to the irrigation water management and allocation with the aim to enhance crop productivity
- Increase the use of satellite data for the large scale irrigation schemes which normal suffer severe lack of data and information
- Enhance the role of Space Technology in Water Management to support the operational decision pertaining to the irrigation water management and allocation

5.17 Innovative Research in Water Resources (TS 36)

The session explored sediment management alternatives for reservoirs such as improve water stress tolerance of wheat genotypes and improve actual water use in a sprinkler irrigation system.

Main Outcomes:-

- Researches proved that the wheat production irrigated by Drip irrigation was increased by 10% comparing with other irrigation techniques.
- Explores the applications of Hydrodynamic Modeling simulation under different scenarios for the Blue Nile and the impact of the upper Nile projects on downstream for sediment transport (depositing and erosion) and its operation.
- The importance of studying the impacts of flushing of reservoirs on the downstream before flushing (socioeconomic, environmental and morphological changes).
- The Importance of studying the impacts of upstream developments in downstream areas to mitigate the negative impacts and maximize the mutual befits (Win-Win).

5.18 Climate Induced Water Hazards drives Human Insecurity in the Eastern Nile River basin (SIWI, International Centre for Water Cooperation (ICWC) under the auspices of UNESCO) (TS21)

The session highlighted the impact of climate change on economy, social aspects, ecosystem services and environment; assessing the impact of climate change on water resources availability, quantity and quality in addition to investigating uncertainty in climate change and future predictions of water resources availability and presenting the impacts of Climate and Anthropogenic Activities on Water and Food Security in Ethiopia as a case study in Eastern Nile

Main Outcomes:-

- The necessary need for cooperation between downstream and upstream countries to face the challenges of Climate Change.
- The importance of management/adaptations plans in facing the future impacts of climate change can prevent a lot of conflict and no stability.
- Climate change could make cascading impact on regional and global security.
- The importance of exploring cooperative transboundary river management strategies for the Eastern Nile Basin.

5.19 Dam Break Risk Assessment (TS 26)

The session focused on the topic of dam failure, either earth or concrete dams, occurs due to natural disasters or man fault. Consequently, the failure causes losses of lives and, economic drawdown due to uncontrolled flooding, so far research on dam failure/break for predicting the negative impacts and accordingly for the necessary measures of mitigating such impacts and Research and studies on concrete dams break and its impact downstream using numerical modeling techniques and risk management analysis.

Main Outcomes:-

- The Dam Surveillance aims to managing the risk and reducing the probability of occurrence by providing a means of early identification of undesirable events that possibly cause failure.
- The cooperation among the dams' operators is essential to help in decreasing the effect of such event.
- The data collected during surveillance (inspection and monitoring) must be recorded, updated, and kept in a known, dedicated, and reliable archiving system.
- The results and output from inspection, monitoring and diagnosis activities must be recorded and kept throughout the life of the structure.

5.20 Dealing with Climate Change Impact on Water (TS 37)

The session identified how climate change would affect soil water and soil salinities and henceforth agricultural production and examined how a local accurate and up-dated terrestrial DEM is more accurate and crucial for risk assessment of sea level rise (SLR) in Egypt through the evaluation of the impact of the combined effect of SLR and storm surges on the low lands of the Nile delta of Egypt, in addition to investigate the applicability of SUDS in arid regions and examine the opportunities to improve global and national hydrological systems to monitor drought risk status and outlooks in drought –affected countries especially in Africa.

Main Outcomes:-

- The need of integrated land and water management plans to guide investment plans.
- A local accurate and up-to-date terrestrial DEM is needed for precise risk assessment of sea level rise in Egypt.
- Enhancement and stabilizing of coastal sand dunes as a natural protection from SLR impacts should be considered.
- Study the suitability of different innovative adaptive capacity solutions such as Building with Nature techniques, in order to improve our adaptation range (resilience).
- The importance of establish an intergovernmental working group on drought to face challenges in a global scale.

5.21 Vulnerability of Water Resources to Climate Change (TS 23)

The session covered the issue of climate change and its impact on water resources and the extent of the world's interest in this regard, in addition to identifying the tools and models used to forecast the climate change and its impacts on rainfall and sea level rise and research on climate change worldwide for better understanding and mitigation.

Main Outcomes:-

- Research on climate change vulnerability is taking place over the globe for better understanding and impact mitigations.
- Early warning systems are effective but till now needs to be upgraded and to construct more protection works.
- The need of cooperation between the Nile basin department of WRRI and the meteor-authority to establish a complete warning system.

5.22 Young Innovators STEM Schools (TS28)

The organizing committee worked alongside young innovators to make sure their participation in the conference and have their voices heard. The Session covered the role of young innovators, they can play a significant role in the future of water resources management, in accordance with their evolving capacities and increasing autonomy, to be engaged in the future decision-making processes and presentation for the STEM school's students innovations in the field of water resources conversation.

Main Outcomes:-

- Role of young innovators in the future of water resources management, in accordance with their evolving capacities and increasing autonomy, to be engaged in the future decision-making processes.
- The importance of encourage students to share ideas on Water saving and water resources administration.

5.23 Three Minutes Thesis Competition (3MT) (TS38)

CWW 2019 was the first event in the Middle East and Africa to host a Three Minutes Thesis Competition (3MT). The competition is to present different thesis in the fields of IWRM, Irrigation Techniques and Food security by Post graduate students from different universities in Egypt in the aims for encouraging graduate students to practice and develop effective communication skills. Participants had just three minutes to explain the breadth and significance of their research projects to a non-specialist audience.

Winners of the 3MT competition:-

- Winner of the competition: Hazem U. Abdelhady - Faculty of Engineering Cairo University "Optimal Selection and Design of Small Hydropower Projects.
- Runner-up: Yasmeen Samir - Faculty of Engineering Ain Shams University" hydrodynamic of Nile using 1D model".
- People's choice: Nahla A. Helmy - Faculty of engineering Cairo university "Remote Sensing Enhanced Water Budget Calculations for The Sudd And Bahr El Ghazal Basins"

5.24 Farmers' Best Practices in Water Conservation (TS27)

The Ministry of Water Resources and Irrigation launched the Second National Competition to Rationalize the Consumption of Water "Save it... to get it" in February 2019 and concluded in September 2019. The session included presentations on farmers' best practices in water conservation. Selected farmers also provided details of successful models and lessons learned from the practical side.

Main Outcomes:-

- The Importance of encouraging farmers to use modern irrigation techniques.
- The necessary need for raising the awareness of farmers about the importance of practicing rationalization of water consumption especially with the water scarcity challenges facing Egypt.

5.25 Best Graduation Projects Competition (TS29)

This session was a part of the best graduation projects competition that was held under the umbrella of Cairo Water Week and sponsored by the DNV-GL Company. Graduates of Governmental and private universities were encouraged to apply for their graduation projects for the 2018-2019 academic years, which are related to water fields.

Competition Winners:-

The Scientific Committee of Cairo Water Week has selected the best three Graduation Projects as follows:

- First Rank: Agriculture Greenhouse Automatic Control System Based on Hydroponic Technique, Faculty of Electronic Engineering, Menoufia University
- Second Rank: Flood Protection, Storm Drainage Network & Ground Water Management for Shalateen City, Ain Shams University.
- Third Rank: Household Water Treatment Unit for Shallow Underground Water In Delta Region, Zewail City of Science And Technology

5.26 Saline Water between Softening and Desalination (TS39)

The session covered the issues related to saline groundwater, desalination and wastewater and fast softening of salty water using nano-sized zeolite by affordable process to solve the problem of water hardening; case of removing iron and manganese from groundwater of Wadi Qena by using Synthetic Zeolite as a low-cost adsorbent in addition to presenting the application of Per-evaporation Technique in the Desalination of Saline Water as novel, cost-effective, simple and more efficient technologies than the current techniques and Highlighting the non-conventional decentralized wastewater treatment Plants (DWWTP) as an alternative for small communities in Palestine and reuse of the treated water for domestic and agricultural purposes and potential of desalination powered by solar energy based on techno-economic analysis for modular multi-scaled desalination units in Egypt.

Main Outcomes:-

- The need of scale up the application of per-evaporation technique in the desalination of saline water as an example of the latest in desalination technology.
- The importance of searching for new techniques in the desalination of saline water and A pilot plant should be designed and constructed for further evaluation.
- Highly recommended to develop further studies on effect of zoolitic material on health is required
- Renewable (solar PV) powered desalination could be a very feasible solution in many regions especially the sunbelt countries
- Monitoring system tools is a key for controlling the over pumping in ground water wells working by solar irrigation.

5.27 Converting Low Quality Water into Usable Water Resource - Scientific Conference (TS40)

The session discussed converting Low Quality Water into a Usable Water Resource with addressing issues related to drainage water, domestic wastewater and brackish and saline groundwater through presenting the impact of wastewater irrigation on soil, plant and human health and the recommendations to minimize pollution loads, in addition to discussing the management of untreated brackish groundwater for aqua-agriculture systems in the Western Nile Delta and discuss the management of saline groundwater for irrigation of Date Palm in the hyper arid climate of the UAE.

Main Outcomes:-

- The integrated aqua-agriculture approach certainly has a future in Egypt and other countries of the Middle East and seems to be a good business proposal, but several uncertainties and questions still remain to be answered.
- Future studies should be addressed to investigate the promoting factors affecting translocation and accumulation of trace metals and proliferation of microbial pathogens in various plant parts in relation to environmental conditions and climate changes.
- Conducting awareness campaigns to farm workers and consumers to inform them about the potential health risk of using drainage wastewater in irrigation.
- Proper management of wastewater reuse is urgently required within guidelines frame of FAO/WHO to ensure safety, and sustainability.

FINAL RECOMMENDATIONS

CHAPTER 6

AND FUTURE VISION

6.1 FINAL RECOMMENDATIONS

- The activation of water rationalization, water efficiency programs and the expansion of non-conventional water resources are essential to bridge the gap between water supply and demand. Non-conventional waters play an important role in arid and semi-arid areas such as the Mediterranean countries. However, the planning and management of these resources needs to take into account the social, economic, institutional, regulatory, legal, environmental and technical aspects.
- The absence of transparency, lack of transboundary cooperation of shared water, and unilateral development projects of upstream countries in some river basins are the main challenges related to water scarcity. This puts many parts of the world under social, economic and political pressures associated with water and energy.
- The global community has to unify its efforts targeting climate change adaptation and mitigation through effective policies and strategies. It is urgently required to improve cooperation over water, particularly given the climate change-water-security nexus by identifying the need for cross-sectoral approaches, linking technical and political processes, and actively involving local stakeholders from the planning stage through to implementation. In this concern, young water professionals and journalists play a vital role in water diplomacy as they bring innovative dimensions for transboundary cooperation.
- Developing countries have to exert more efforts to achieve sustainable development through the implementation of effective integrated water resources management policies aiming at improving quality of life for all citizens in social, economic, cultural, environmental and political aspects.
- There is a general acceptance for the importance of enhancing transboundary water cooperation and shared water management in order to sustain transboundary water resources to achieve sustainable development on the basin level. Several international entities such as EU showed superior willing to support countries addressing the issues of big dams on Transboundary Rivers such as the Nile and the Mekong.
- Water diplomacy is an important key to sustainable development. Therefore, international water-related organizations should not only commit themselves to cooperate with and support developing countries to achieve sustainable development and food security, but must also play key mediation roles to bring countries together to reach fair agreements that guarantee equal rights and obligations for all conflicting partners.
- Sharing knowledge, expertise and technology transfer among developing countries are essential especially in the fields of integrated water resources management, water monitoring networks and early warning systems. This calls for effective bilateral/multilateral cooperation projects supported by national and international funding agencies.
- Reforming the water business environment is one of the most important areas in the global development agenda for donors and governments. Therefore, good water governance, transparency, stability and predictability are indispensable foundations for integrated water management as well as improving economic development.
- Public-private partnerships (PPP) involve collaboration between governmental agencies and the private-sector that are used typically to finance, build, and operate water related projects. Desalination projects in water scarce countries are good candidates for such financing mechanism.
- The role of partnership with farmers, the rest of the community and all water users is very important for any process aimed at improving water management, rationalizing water use and preserving water resources from pollution.

6.2 FUTURE VISION

- It is important to promote scientific research in the design and application of smart irrigation techniques to replace traditional irrigation systems in developing countries. These systems significantly improve the efficiency of irrigation water use. These smart systems also monitor weather, soil conditions, evaporation and plant consumption to adjust irrigation schedules according to actual planting conditions.
- Scientific research in the field of smart irrigation, where irrigated agriculture is managed on the basis of monitoring, measuring and responding to spatial changes at the field level, should be strengthened with a view to improving input yields while conserving resources.
- Innovative research-based solutions in the use of renewable energy in irrigation projects that will not only solve current energy crises in general but in particular give a boost to agribusiness in terms of crop production and efficient use of water through the use of modern technology