المجلس العربي للمياه
Arab Water Council

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

نوفمبر ٢٠١١
November 2011
المنتدى العربي الثاني للمياه
Second Arab Water Forum

2nd Arab Water Forum

SYNTHESIS REPORT

Arab Water Council, 2011

2ND ARAB WATER FORUM

20-23 November, 2011

Cairo, Egypt

Final Forum Report

SYNTHESIS REPORT

Arab Water Council, 2011

Cairo Declaration of the 2nd Arab Water Forum

"Living with Water Scarcity"

November 20-23, 2011

The Arab region is one of driest regions in the world. The gap between water availability and the ability to meet different water needs is growing. The region contains 5% of the world's population with only 1% of its water resources. Eighteen out of the twenty two Arab countries suffer from scarcity. By 2050 the whole Arab region will face acute water stress. The Arab region seeks to lead the world in methods for adapting to water scarcity. To do so 450 professionals, political leaders, governmental officials, NGOs, private businesses, scientists, civil associations, development organizations, and financing agencies from 25 countries convened in Cairo in November 2011 to identify solutions and commitments to face the challenges of "Living with water scarcity".

In the Arab region, food security is essential for political, social and economic stability and is strongly linked to *water security*. Food production within the region must be balanced with food imports. Agriculture will continue to be a major component of the regional economy, contributing to employment, social and food security enhancement. The agriculture sector accounts to an average of 80% of water use. Part of future fresh water uses will be diverted to competing priority sectors. With the potential of new water development in the region is either limited or costly, the main option available is to produce more with less water; i.e. increase water use efficiency and productivity. The region must consider and adopt innovative options and approaches to ensure the sustainability of improved agricultural production. This can only be achieved through the applications of science and technology. New research is needed to enhance tolerance to biotic and drought biotic stresses, crops calendar modifications (i.e. early sowing), more efficient water use practices (i.e. supplementary irrigation, and water harvesting), developing new cropping production pattern and increased productivity of saline soils and saline waters.

Policies in the region should; adopt integrated water resources management, better coordinate among sectors and reallocate subsidies to higher water-use efficient crops and use of water saving technologies. Investments in agriculture must be a strategic public policy priority which should be harmonized with water security and energy strategies. A regional self sufficiency with certain food products in comparative advantage countries is an option that should be considered. Water policies should encourage public-private partnership and cost recovery of investment and O&M to ensure the financial sustainability of the water sector.

The region will be more dependent on non-conventional water resources such as treated wastewater, desalinated water, agricultural drainage water, , and will have to expand in management practices such as rainwater harvesting, groundwater recharge, conjunctive use, and demand management along with traditional sources and options. Countries must develop low cost-low energy consumption technology for treated wastewater and desalination.

The Arab Region is doing relatively well with respect to access to clean water and sanitation. However, the Arab countries need to invest more in water to be on-track with the MDG target on water. The countries in the region need to scale-up sector reform that improve water governance and close the gaps in institutional and human capacity, non-revenue water, cost-recovery, master-planning and public awareness. Access to clean water and sanitation is a legitimate right for all people in the region and particularly in the territories under occupation in Palestine and El-Golan.

The region's climate is getting warmer, drier and more variable. *Climate change* adds uncertainty to water related decisions and is likely to change precipitation patterns including amounts and intensity, increase temperatures, and shorten growing seasons; frequent and more intensive droughts will lead to a reduction in crop production and put more pressure on available water resources. Sea level rise could affect 43 cities in the Arab region and large areas of the most populated zones. Millions of people in the Arab region could be displaced.

Meeting climate change challenges requires innovations, applications of science, technology, monitoring information systems and increased investments in rainwater storage and improving agricultural water productivity. Climate change impacts should be included in master plans for water use in all sectors in the region. Water investments offer the best "no regrets" strategies to adapt to climate change. Countries in the region must fund research and link it with development.

To better manage water, a common and integrated water and climate information platform should be created to strengthen the regional and national capacities to deal with uncertainty and to facilitate public access to water related data. New tools for decision-making under uncertainty are needed. An Arab Water Fund should be created to support these needs. The Arab region needs to develop its own climate models. Mechanisms to support dialogues between the climate scientists, the water community, and civil society must be established.

The Arab region needs periodic reporting on the state of the water, to monitor trends. Preliminary results from the Arab Water Council-CEDARE 2nd Arab State of the Water Report, due to be launched in 2012, shows interesting findings that are important for shaping future policies in the region.

Transboundary waters are critical to Arab countries. More than sixty five percent of the Arab countries surface water originates outside their political borders. Shared water resources must be seen as a tool for building cooperation and peace, and for promoting fair and equitable allocation of water resources. Regional cooperation among countries in the Arab region and with their neighbors must be based on mutual interests. Countries need to explore how to promote more cooperation, integration and how to exchange benefits through dialogue and negotiations. Countries need new mechanisms for conflict resolution. New metrics to describe water balances should be explored at basin level including both green and blue waters. The establishment of an Arab Water Conflict Resolution Facility is recommended under the umbrella of the Arab Water Council. Civil society and non-governmental organizations can play a role in bringing parties together to bridge the political and technical gaps and help avoid conflicts, and continue as the platform for dialogue among stakeholders. Countries in the region should develop a regional legal framework that accounts for fair water sharing, joint vision, joint development, and pre-approval on new water related projects in transboundary basins. Meanwhile, the Arab Region calls for the amendment of the 1997 UN convention on the non-navigational uses of international watercourses to embrace Integrated Water Resources Management (IWRM), and the river basin approach for the equitable and reasonable utilization of all waters within River basins including surface water, groundwater, blue-water, and green water.

The region should play a world leadership role on managing water under scarcity. The linkages between politicians and experts on water issues in the Arab region must be improved together with empowerment and involvement of end-users in the decision making of water management. Solutions to water stress must engage all stakeholders from the bottom up.

The Opening Ceremony 20 November 2011

ACKNOWLEDGEMENTS

This report was prepared by a team comprising Dr. Safwat Abdel-Dayem (Secretary General, Arab Water Council), Jerome DelliPriscoli (Consultant) and Matthew McKinney (Center for Natural Resources & Environmental Policy, The University of Montana, USA).

The team wishes to thank the session reporters for their outstanding summaries which captured the highlights and outputs of their sessions. This report reflects the dedication and hard work of the session conveners, contributors and speakers, who without their work, the 2nd Arab Water Forum could not achieve such remarkable level of success. Behind this achievement stand also the generous sponsors who stood by the Arab Water Council to make the event a real land mark on the way for water and food security, adaptation to climate change, and equitable use of shared water resources in the Arab countries.

Finally, this report would not have been possible without peer review and guidance of H.E. Dr. Mahmoud Abu-Zeid, the President of the Arab Water Council and the Chairman of the Organizing Committee of the 2nd Arab Water Forum.

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Executive Summary

The Arab region is one of driest regions in the world. The gap in the region between water availability and the ability to meet different water needs is growing. This presents opportunities and challenges. The Arab region seeks to lead the world in methods for adapting to water scarcity. To do so professionals, political leaders and stakeholders from 25 countries in the region and several international, regional, and national organizations convened in Cairo to discus meeting three challenges to *"Living with scarcity"* which are: (i) securing basic human needs for sustainable development; (ii) the risk of climate change on water, between uncertainty and cost of adaptation; and (iii) sustainable and fair solutions for trans-boundary rivers and groundwater aquifers.

Securing Basic Human Needs

The Arab region contains 5% of the world's population with 1% of its water resources. This population could double in the next fifty years. Water scarcity in the Arab world is alarming: 18 out of 22 countries suffer from scarcity, 8 have less than an average of 200 cubic meters per capita per year, and this average could drop to less than 100 cubic meters in the next decade. By 2050 the Arab region will face acute water stress. High water stress combined with weak water governance, climate change and low public awareness of water issues exists throughout the region. This stress is most pronounced in Gaza.

Solutions to the regions water stresses must involve publics, stakeholders and civil society from the bottom up. Countries should promote Islamic values for water conservation and establish and enforce water rights. They must increase the capacity of rural people, especially women, to manage available water resources.

Food security is essential for political and economic stability in the Arab region and it is linked to water security. The Arab region imports 50% of its water as virtual water through food imports. Agriculture will continue as a major component of the regional economy, providing jobs as well as food security. The agriculture sector accounts for about 5% of GDP in the region, with distinct differences between countries, and on average uses 80% of water. There is a high potential to save water by improving efficiency as well as productivity. Since more fresh water uses will be demanded by competing sectors the region must adopt innovative options and approaches to ensure the sustainability of agricultural production.

Applications of science and technology are the key forces for producing more with less water. New methods are needed to enhance tolerance to drought, early sowing, supplementary irrigation, and increased productivity with saline soils, saline waters and new cropping production pattern.

Food production within the region must be balanced with food imports. Policies in the region should; adopt integrated water resources management, better coordinate among sectors using water and reallocate subsidies to water savin rops and water saving practices. Investments

in agriculture must be a strategic public policy priority harmonized with the water security strategy of the Arab League. Countries in the region must encourage public-private partnership (PPP) and cost recovery of investment and O&M of water projects to ensure the financial sustainability of the water sector. The inter-dependence of water, energy and food challenges in the Arab region require new integrative approaches and frameworks for determining and resolving trade-offs to meet increasing demand.

In general, the Arab Region is doing relatively well on access to clean water and sanitation. However, the Arab countries need to invest more in water and sanitation to be on-track with the MDG target on water. The Arab Ministerial Water Council recently approved a monitoring mechanism for the region that has been developed to take into consideration the specificities of the Arab region, which builds upon the basic indicators of the water and sanitation MDG. The countries in the region are committed to sector reform that close the gaps in institutional and human capacity, non-revenue water, cost recovery, master-planning and public awareness. Investing in household water-saving devices, repair of network leakages, and in landscape water conservation programs could reduce water losses considerably.

The region will use more non conventional water securing methods such as treated wastewater, agricultural water reuse, groundwater recharge and re-use, conjunctive use, demand management, and rainwater harvesting along with traditional sources such as surface water storage. Countries must develop low cost-low energy consumption technology for treated wastewater and desalination. Research and development should be promoted on green technologies, particularly solar application in water treatment, purification and desalination. It is critical that countries in the region develop cultures of recognizing waste water as a resource and head towards a zero-waste policy.

Risks of Climate Change

The region's climate is getting warmer, drier and more variable. Climate change adds uncertainty to water related decisions and is likely to change precipitation patterns, increase temperatures, and shorten growing seasons and lead to a reduction in crop production. Climate change is likely to mean more frequent droughts which could decrease some GDPs by one percent. New tools for decision-making under uncertainty are needed. The Arab region needs a framework for water security and climate change.

Sea level rise could affect 43 cities in the Arab world and large populated areas of the Nile delta. Millions of people in the Arab region could be displaced. These trends mean also that food imports are likely to increase.

Water investments offer the best "no regrets" strategies to help countries in the region adapt to climate changes. The investments are needed regardless of causes or extent of climate changes. Climate change impacts should be included in master plans for water use in all sectors in the region. Adaptation should be integrated into all water projects and across all

sectors of planning. Therefore, building human and institutional capacities for assessing climate change impacts is a key step.

Meeting climate change challenges requires innovations, applications of science, technology and increased investments. Countries in the region must fund research and link it with development. An Arab water fund should be created to support these needs. The Arab region needs to develop its own climate models. Mechanisms to support dialogues between the climate scientists, the water community, and civil society must be established.

Regional and national monitoring information systems are needed. To better manage water, a common and integrated water and climate information platform should be created to strengthen the capacity to deal with uncertainty and to facilitate public access to water related data. United Nations and other world information systems should be integrated and adapted to the specific needs of the Arab and MENA Region. The Arab region needs periodic state of water reports to monitor trends. Preliminary results from the Arab Water Council/CEDARE, 2nd Arab State of the Water Report, due to be launched in 2012 and shows interesting findings that are important for shaping future policies in the region.

Sustainable and Fair Solutions for Trans-boundary Waters

Problems in fresh water could lead to other societal problems if not solved quickly. Trans-boundary waters are critical to Arab countries. Sixty five percent of the Arab countries surface water originates outside their political borders. Shared water resources must be seen as a tool for building cooperation and peace, and for promoting equitable allocation of water resources and their benefits.

Regional cooperation among countries in the Arab region and riparian countries must be based on mutual interests and understanding. To this end, riparian countries should promote more cooperation and integration among themselves and benefit exchanges through dialog and negotiations. Countries need new facilities for conflict resolution and must look to new ways to cooperate and to involve civil society. New metrics to describe water balances should be explored at basin level including both blue and green water.

Without replacing the official channels, the Arab Water Council can play a role in bringing stakeholders together to bridge the political and technical gaps in the region's water policies, procedures and practices; help avoid conflicts, and continue as the platform for dialogs among stakeholders in the Arab countries. For peace and stability, shared water issues must be priorities in the development strategies in Arab countries. Countries in the region should develop and implement a regional treaty to establish a legal framework that accounts for fair surface and ground water sharing, joint development, joint vision, and pre-approvals mechanisms on new water related projects in transboundary river basins.

Introduction: the Forum Process

Under the auspices of the League of Arab States and the Ministry of Water Resources and Irrigation in Egypt, the Arab Water Council (AWC), organized the 2nd Arab Water Forum in Cairo on 20-23 November 2011. The forum's theme was *"Living with Water Scarcity."* More than four hundred participants from 25 countries attended the forum. They included 6 ministers and 4 ministerial representatives as well as political leaders and heads of regional and international water and water related organizations.

The forum was designed around an exhibition and 21 substantive sessions which included the opening plenary, 3 main theme sessions, 9 special sessions and 8 topic sessions. One hundred and twenty six attendees participated as speakers. The sessions were based on three main themes presented in 3 plenary sessions; (i) Securing Basic Human Needs (Water, Food and Environment) for Sustainable Development; (ii) the Risk of Climate Change on Water between uncertainty and Cost of Adaptation; and, (iii) Sustainable and Fair Solutions for Trans-Boundary Rivers and Aquifers. Special sessions and topic sessions were run in parallel with smaller groups. These sessions produced extensive dialogs and close to 100 solutions and recommendations along with 21 commitments.

Each of the 21 sessions had a team of Reporters who completed a standardized form to summarize the sessions, including the most important issues, most important solutions, areas of disagreement, and commitments. Session Reporters met with the forum General Reporter and forum organizers each evening to review their reports. The reports formed the basis for the main forum report.

In the final session participants prioritized their recommendations within each of the three main themes. They reviewed and discussed a draft of the Cairo Declaration in light of the prioritized recommendations. The resultant interactions and suggestions were captured by the General Reporter and used to revise the Cairo Declaration and the report. The Cairo Declaration and report were then drafted and sent to a review panel, chosen by the AWC, which represented a cross section of stakeholders in the region. After the reviews the draft was adjusted and the report was finalized.

The presentations, the deliberations, the agreements and disagreements of more than 400 participants of the 2nd Arab Water Form established a common platform of understanding for launching actions for sustainable development under water scarce conditions in the Arab countries. This report as well as all power point presentations and other relevant forum material will be made available through the AWC website www.arabwatercouncil.org and all possible means of communication.

The outcomes of the 2nd Arab water forum are major regional inputs from the Arab world into the 6th World Water Forum and Rio +20 and other international forums. This report as well as all power point presentations will be loaded on the Arab Water Council

Theme1: Securing Basic Human Needs: Water, Food, and Environment for Sustainable Development

State of Arab water: The Arab region is becoming water insecure. It has limited ability to store water inter-annually. Many people still lack access to improved drinking water and sanitation. Poor water management practices are prevalent. There is a lack of water data and that which exists is often inaccessible and often not freely shared. Contamination, salinization of groundwater and groundwater overdrafts are growing. Climate change variability is likely to make the region more susceptible to extreme hydrological events.

The region's increasing water demands, coupled with deteriorating infrastructure, threatens the quality of water services. Limited institutional and human capacity, high non-revenue water, low cost recovery, and the lack of adequate master-planning are challenging the water sector in almost all countries of the Arab region. Non-revenue water levels are exceptionally high for utilities of many Arab countries ranging between 20% to as high as 60%. Low cost recovery rates are prevalent in many water and sanitation utilities in the region.

The population of the Arab region could double in the next fifty years. High water stress with a dependency on weak water governance and low public awareness of water issues pervades the region. In the near future, the gap between demand for water use and supply will grow in all Arab countries thereby creating a condition of acute water scarcity in the region. There are two basic actions to bridge this growing gap: (1) increase efficiency and manage demands; and (2) improve supply-side management.

Defining water and food security for the Arab region: Water security was defined as equal to sustainable use under extreme conditions of floods and droughts. Food security was defined as equal to all people at all times having access to food.

Food Security: There is a growing need to balance food production within the region with food imports, and to identify what types of food should and should not be produced within the region. Agriculture in the Arab region accounts for about 80% of the water use. Yet, the region is one of the largest grain importers in the world. Water poverty explains over 40% of food insecurity; that is physical not economic scarcity. On-farm efficiency is low but there is a high potential to save water with efficiency. The countries can do a lot more with what they have. Given that agriculture accounts for about 80% of water use in the region, there is great opportunity to increase water use efficiency to help meet growth. The agriculture sector contribution to the national GDP varies widely within countries over the region. For example, it is 13% in Egypt and about 30% in Syria, but as low as less than 2% in some Gulf States. The sector is the largest employer and can employ more than it does now. Thus, agriculture will continue to be a major component of the regional economy, providing jobs as well as food security. People can go back to agriculture programs in Egypt. Indeed, many prefer to move to less urban and more rural areas so political will is needed to encourage young to invest in agriculture, they just need support.

Water has sanctity in the Koran where fairness, equity and conservation in its use are paramount. Water sector reform and modernization of irrigation is an important political

theme in many Arab countries. There will be significant conversions to drip irrigation coming along with other water policy reforms. For example, the Saudi government has been reducing crop subsidies by 70% and banned the cultivation of wheat and fodders. The region can expect more use of integrated basin management, small-scale structures for aquifer recharge, conjunctive management of surface and ground water, participative rather than top-down planning, and demand management. Networking and capacity building such as the programs supported by UNESCO IHP and G-WADI, regional organizations, and village level use of simple but widespread technologies such as cell phones are seen as effective tools to achieve reforms.

Non-conventional sources: The Arab region has limited water resources. In the future, non-conventional water resources such as treated wastewater, saline brackish water, drainage water, desalinated water, and artificial groundwater recharge – along with treated wastewater -- will be important to achieving food and water security for the region. However, such resources are often costly and energy consumptive. There is lack of experience, guidelines, regulations, and risks to health and the environment with these sources. The region must build capacity, transfer knowledge, and improve communication, coordination and integration on non-conventional sources.

Countries in the region should aim for zero waste water; adopt proper irrigation systems such as sprinkler and drip; adopt proper strategies such as subsurface drip; use more salt tolerant plants; establish long term monitoring for soil and groundwater quality; re-use agricultural drainage water and treated wastewater; and intercept poor quality water. This will mean developing low cost–low energy consumption technologies for treated wastewater and desalination; developing locally-based technologies and encouraging collective efforts to plan, develop, operate, and maintain non-conventional energy sources such as wind and solar; develop a national water atlases and national plans, and; developing capacity building programs.

Resource protection, especially for groundwater, means that the resource dynamics need to be better understood. In this regard, the case of protecting Figeh spring system that supplies the city of Damascus, Syria was presented and discussed. Resource protection requires adequate legal and institutional arrangements to be incorporated within the sectoral development plans. Resource protection is cost effective because in the long term it reduces the investment needs for expansion of the water supply systems and also for costly water treatment measures and facilities.

The countries in the region face difficult decisions. Since they have to use non-traditional sources such as treated wastewater, they will need to look to new ways to cooperate and to involve the private sector and civil society. Countries may need to change how water is economically valued within their cultures and to convince politicians of value to non conventional sources.

Desalination: The GCC countries are the largest desalinized water producers in the world, accounting for 60% of the world desalination. Desalination is in the future of the region although it is energy intensive and may have environmental impacts. However, questions on its use remain. Some view it as one possibility in the future which can play a catalytic role in combination with renewable energy, such as solar energy. The German government promotes desalination as part of a holistic approach and advocates that desalination should be done

with other new renewable energy such as solar. Others see it as an option but not the only key to overcoming water stresses.

Some felt that desalination is already becoming critical and that the status quo is not sustainable. Actually, the region has strong private sector participation and innovation in such technology. Since solar power is used in the region it should be used for desalination. Some said that the region needs to start desalination now because its costs are down, especially with more emphasis on using solar energy. More than 100 plants are in operation and some with over 250K m3/day capacity. Further, technology efficiency improvement and productivity are up while investment and production cost are likely to go down by 20-50% in next ten years. At the same time there is more financial capacity in the countries of the region.

Desalination remains expensive and energy intensive. It needs power and training for operations. It has impacts on climate change with its use of fossil fuels. Also, oceans can be polluted and it can raise health concerns. There is saline water and residual salt brines which must be safely disposed of.

Virtual water: Virtual water is really a new expression for the old concept of trade. But trade must be balanced with security of country that must determine what it produces. Countries are not measuring actual evapotransporation to precisely determine water productivity. Measurements of water consumption by crops are critical, but there is still need to enhance efficiencies in surface irrigation; alternative irrigation methods provide additional improvement.

Treated wastewater: Treated wastewater is acceptable in the region. For example, in 1977 a Saudi fatwa supporting the safe use of treated wastewater considered it as an acceptable source of useable water. Wastewater is used in agriculture and should be given much attention by the AWC especially in partnership with CEDARE.

Rainwater harvesting: Water harvesting techniques can be used at different scales for different uses. For examples, water harvesting can be used for supplementary irrigation; losses from rainwater can be reduced by harvesting and benefits increased through groundwater recharge. Rainwater harvesting is environmentally friendly. Rainwater harvesting technologies and training need to be updated and successful case studies of water harvesting in Egypt, Syria, Sudan, Jordan, and Tunisia should be shared.

Private pubic partnerships (PPP): Although a role of the private sector is widely recognized there are many difficulties to its involvement in water resources in the region. Consequently, there is an absence of clear and comprehensive strategy for PPP and a lack of political will based on a general reluctance of monopolies. Risk allocation and risk sharing are critical so as to be sure risks are allocated to the parties best suited to take it. The comparative advantage of PPP must be clarified along with assurances that business can effectively consider social impacts on poor people especially concerning costs of water and rights to good quality water access.

Efficient regulatory frameworks, proper incentives and tariff structure and cost recovery strategies must be designed. This can be achieved through national dialogues among stakeholders to ensure efficiency and affordability for water service. This means compromising between corporate social responsibility and their business profit during negotiation. Water related PPPs are new in the Arab World and lessons from recent programs

and policies of Egypt, Lebanon, Tunisia, Saudi Arabia, United Emirates and Singapore need to be shared. Private sector involvement in Jordan by the Aqaba water company had many challenges such as fixed tariffs versus increasing cost, low salaries, no incentives, and other factors that limited the performance of the private sector in water. However, many of these challenges were faced by changing actions by the private sector and some problems were reversed. Challenges remain with high demand, government interference, and fixed national tariffs.

Information systems and data: The region needs better and more accessible data, simple sets of core indicators and monitoring system for all countries and a common, integrated water information system with a single point of access. The information systems will help to; improve water demand management; increase awareness of water use by the public; integrate green water into water balance assessments; analyze policies looking at basin level, return flows, and overall water use efficiency -- rather than just on-farm irrigation efficiencies -- to ensure equitable distribution among farmers.

Data collection, validation and management are important tools for utility management but challenging to do in the region. In this regard, ACWUA shows how performance indicators, benchmarking, and monitoring systems are important tools for utilities to identify areas of needed improvements. Many countries of the region have developed information systems with performance indicators at both the operational and managerial levels.

Field surveys are effective tools but are hard to execute and to assure date validity. The results of the field testing of the MDG template in two rural communities in Tunisia and Egypt revealed the importance of assuring suitability of the questionnaires for specific communities. Accordingly, modification of the questionnaires must match the target group such as rural community households versus official institutions. Opinion and factual data must be separated in the design of the questionnaires. Thus, training of the survey interviewers prior to the carrying out the field surveys is critical. Also the terminology used in the questionnaires must suit the local language dialect in order to minimize any misinterpretation of the questions or the data.

Four international water information systems; the UN Water Activity Information System (AIS+), IW Science Platform, AQUASTAT, and Cap-Net need to be maintained, upgraded and better integrated. Arab countries and Arab regional water organizations such as AWC and ACWUA should help validation and insuring consistency among these systems.

Research and capacity building: Research and capacity building are necessary to effectively employ non-conventional and innovative solutions to meet food and water security for the region. Research, knowledge and information must better connect with each other and end users such as farmers. There several centers of excellence in water and agricultural research in the Arab region but they have little impact on practices. There is a lack of research funding in the Arab region, a lack of cooperation with the industry, and a lack of individual and institutional capacities in strategic research and development areas such as desalination and the role of solar energy.

Achieving MDGs: The two water and sanitation MDGs directly impact the other MDGs, like goal 1 on poverty alleviation, goal 2 on access to primary education, goal 3 on gender equality, goal 4 on child mortality, and goal 6 on combating malaria and other diseases.

However, the MDG water and sanitation indicators were selected on health bases and as such do not reflect the level or quality of water and sanitation services.

On July of 2010 the UN General Assembly passed a resolution recognizing water and sanitation as a human right. In September of the same year, the UN Human Rights Council reaffirmed, through a separate resolution, that water and sanitation are human rights. Some countries have incorporated the right to water and sanitation into their legislative and judicial system. The right means to have sufficient, safe, acceptable, physically accessible and affordable water and sanitation services for everyone without any discrimination.

In some cases individual citizens have raised and/or claimed their right to water and sanitation through the courts or through the national human rights offices. A special Rapporteur has been designated to monitor the progress in implementing the UN resolutions worldwide and report to the General Assembly on progress. The special Rappoteur addresses the issue of financing and inclusion of the right to water and sanitation into the MDGs indicators particularly for the post 2015 period.

The indicators of the water and sanitation MDGs are monitored through the Joint Monitoring program (JMP), between WHO and UNICEF, and are based on national level surveys. In absolute terms, the Arab region is in a relatively better position in average water and sanitation coverage compared with other regions in the world. The region is on-track to meet the MDG target on sanitation, but is off-track to meet the MDG target on water. Moreover, large disparities in access to water and sanitation still exist between urban and rural areas of the Arab region. Based on the latest (2010) JMP report, sanitation coverage in the Arab region increased from 72% to 82% between 1990 and 2008. Nevertheless, around 60 million people of the region still lack access to improved sanitation facilities. Open defecation rates decreased from 19% in 1990 to 11% in 2008, and thus remains an issue that needs greater attention. An investment in sanitation is a good investment with a return rate of nearly 9 dollars for each dollar invested.

The Arab region has special characteristics as the region includes oil rich as well as less developed countries. Deterioration of water quality and the energy-water linkages were also identified as important factors that need to be considered for the improvements of water and sanitation services in the Arab countries. A regional initiative that builds upon the basic indicators of water and sanitation MDGs has been developed and approved by the ministerial council (MDG+). It is based on the mandate provided to ESCWA and the other partner organizations including AWC through the resolutions of the Arab Ministerial Water Council to develop a monitoring mechanism that takes into considerations the specificities of the Arab region. The additional indicators of the monitoring initiative consider not only accessibility to improved infrastructure, but also reliability, regularity, affordability, sustainability and quality of service provided. A concept note and project proposal has been developed as to implement the MDG initiative. It will produce two regional monitoring reports on the MDG+ indicators in 2013 and 2015; institutionalize National Monitoring Teams and a regional data management platform; establish an MDG+ Unit, and; launch a website for the dissemination of promotional materials. This effort includes ESCWA, ACWUA, CEDARE, RAED, AWC, and WHO.

Water sector reform: Improving water and sanitation services has been one of the targets of the reform process in Egypt. The establishment of a Holding Company and a Regulatory Agency by presidential decrees in Egypt was an important milestone in the reform process.

The service coverage area of the Holding Company includes all of Egypt with 11 million customers representing 82 million citizens. The current national service coverage stands at 98% and 50% for water and sanitation respectively which shows that Egypt has achieved the water target and does not seem to be on track to achieve the sanitation target. In Lebanon, the example of private sector involvement was not very successful. Reform processes in other countries such as Jordan, Morocco, Saudi Arabia and Tunisia were reported to the forum but mentioned in the discussion.

Water governance: Water governance in the region often lacks transparency due to centralization and lack of accountability. Poor water governance will have a high cost on Arab countries in the face of water scarcity. However, more democracy is coming to the region and it will improve transparency, accountability, rule of law, effectiveness and participation in water resources decisions. Because water touches the life of people, implementing water governance can be a catalyst towards adopting democracy in the region.

The UNDP report under preparation regarding water security assesses the political, economic, financial issues surrounding water in the region. It identifies the needed actions to establish water governance and sustainable development of water security in the Arab region. For the successful implementation of good governance, there are some requirements such as inclusiveness, accountability, participation and transparency, sustainability, responsiveness, justice and moral.

Water governance should combine bottom-up and top-down approaches remembering that no "one size fits all." Governments in the region need to adopt solutions for better governance standards. Public awareness, participation of water user associations, political will, and public participation are among the main tools to reach sustainable development and implementation of water governance.

Debatable Issues

Water pricing is not generally accepted in all Arab countries. However, the concept of cost recovery especially for O&M is more acceptable. There is no networking linkage between WUA Governing Bodies. While there is general agreement on the need to build capacity many feel that e-Learning should not replace face-to-face learning -- although it adds value to the conventional learning. There is disagreement on investments in rainwater harvesting from the farmers and remote community managers who consider that rainwater harvesting adoption is not always feasible. Disagreement exists on the extent and importance of the impacts of desalination on marine life. Many differences exist on private sector interventions and how to find mechanisms that guarantee the positive social impacts given the profit business models. While most felt that PPPs should be one of the existing solutions they should not be seen as an end in themselves. Profitability of the private sector has to be discussed in a transparent manner that identifies who pays, how they pay, the taxes and tariffs.

Disagreements on research priorities for the Arab region exist. NGOs and civil society are not significantly involved in water strategies and there is disagreement on the extent to which they should be. There is no agreement upon definition for water security. In the end, it is hard to implement water governance when many countries of the region lack democracy practice.

Priority Solutions

The presentations and discussions in all sessions related to theme 1 identified number of actions/solutions that can contribute in effective improvements the state of water and food security in the Arab (appendix 1). Through an active debate and free voting during the wrap-up meeting the participants identified the top priority solutions in the following order:

1st Priority Solution

Implement integrated approaches -- treated wastewater, rainwater water use efficiency, groundwater recharge, conjunctive use, demand management

2nd Priority Solutions

1. Improve water use efficiency
2. Link research with development to produce more food with less water
3. Promote Islamic values for conservation
4. Find new ways to involve civil society in decision-making and action

3rd Priority Solutions

1. Increase the capacity of rural people – especially women – to manage available water resources
2. Establish and enforce water rights
3. Develop low cost-low energy consumption technology for treated wastewater and desalination

Theme 2: The Risk of Climate Change on Water: Between Uncertainty and Cost of Adaptation

Historic Perspective: Climate change is not new. The World Meteorological Organization has played a long role in climate change. In fact, international concerns about climate change date back to the 19th century and interest in climate change is recorded throughout history.

In the classic world people understood differences in climate but generally thought of it only as something to do with the atmosphere. While there is natural variability, many scientists view that recent climate variability goes beyond what might be called natural variability. There is growing concern and evidence that humans are changing climate. Based on trend data from 1853, we see that CO2 is growing as the world is getting warmer than it has been for a long time.

There are many uncertainties about past, present and future climate. Precipitation records and dates are generally less than 200 years ago. We do not know the frequency of hurricanes and cyclones 100-200 years old. We have inadequate observations over the oceans. There are limitations with the super computers resolutions. Models are getting better at reproducing the past but there is still uncertainty in reproducing the climate patterns of the past. However, since the models must take into account green house gases to reproduce the past it looks like some change is human induced.

The Arab Region and Climate Change: Climate change adds to problems through shortened growing seasons and likely precipitation reduction. Lands in the Arab region have experienced significantly drier weather over last 100 years. Population growth and other external stresses are leading to increased vulnerability to extreme hydrological events. The region is getting warmer, drier, and more variable. The region is experiencing the highest temperatures since the 1800s, and there is less but more intense rainfall that could increase droughts and floods. This is demonstrated with the 2007/8 droughts. The coping strategies of last hundred years may no longer be useful and migration to cities with disruption in traditional life is occurring. Increase frequency of drought could decrease some GDPs by one percent. Between 16 to 50 percent more people in the region will be exposed to water stress.

All the components of food production could be affected by climate change. Yield gap and land availability potential will change. There is likely to be a 40% reduction in annual rainfall making the region even drier. Thus, climate change could decrease cultivated land and agricultural production. Climate change could produce significant water gaps in various parts ofof the Arab region and that means that the region will have to import more food and use more desalination along with other methods.

Participants called for Integrated watershed management in rural areas; water re-use for agriculture; climate change adaptation in sector master planning; transnational climate change adaptation measures in the water sector, and; increasing awareness, involvement, and influence of civil society in climate change issues and associated decision-making. Following the last Arab summit there were many development projects suggested to deal with climate

change. However, a gap has grown between policy and implementation in donor funded development programs.

Issues of Justice and Equity: Impacts of climate change raise questions of justice and equity. Man-made impacts often imply that all people are equally responsible for impacts and that is not true. Some suggested that the polluters should pay the people whom are impacted. Global Framework for Climate Services (GFCS) focus priority for implementations on the most vulnerable and least developed such as Africa countries and others. Climate change related aid should go to the neediest.

Climate change impacts will be super-imposed on the poor. The increased frequency of floods and drought will lead to increases in poverty. Both men and woman, particularly the young generation, are stakeholders in climate changes and the changes will affect them differently. For example, women travel as much as 7 hours in some rural areas to gather scarce water, as in the current wave of drought in Somalia. There are also impacts on the health of people. Seventy percent of people in the region live in rural areas and need more climate resilient crops. Most people live along the coast and many lack basic services, which mean that poorer people could lose houses and associated income, since many of them work out of their homes.

From Global to Regional Circulation Models: The IPCC Global Circulation Models (GCM) are not applicable to the Arab region. Currently the world is running 23 GCM models, but all of these were constructed in the developed world and no Arab country is producing their own climate change models. Consequently the region must be careful about how to use the IPCC GCM models.

Many participants did not know what is inside the GCM models. Speaking for several, one participant expressed dissatisfaction that they in the region are only asked for measurements and data that is then published in IPCC reports. Countries in the region should develop their own climate models and compare the regional results with GCMs. Homegrown models are also needed to assist the region in negotiations.

Most of the models focus on CO2 and concern only climate and not land use. The region needs to strengthen its capacity to understand and analyze GCMs and to downscale GCMs to the regional levels with RCMs.. It is very important to use the outputs of the ongoing climate change scenarios projects (as provided by UNESCO, ESCWA, UNEP and UNDP) in assessing the future impacts on the water resources of the Arab region.

Types of Response to Climate Change: There are specific Arab region efforts to address the problem of climate change. The Arab Ministerial Declaration on Climate Change in 2007 demonstrates Arab commitment to address climate change. The subsequent reference to climate change in the Arab Water Security Strategy demonstrates that climate change has now moved up into the agenda of the water sector in the Arab region.

There is a UN regional initiative to assess the impacts of climate change on water resources and socio-economic vulnerability on the Arab region. This initiative will take a GCM to a RCM, then to a hydrological model and subsequently to a vulnerability assessment and integrated mapping. It uses a new set of parameters rather than old scenarios, along with new assumptions and baselines to reduce uncertainty. It focuses on how to asses and integrate impacts. While this is promising, there is uncertainty about which GCM to use.

Some universities and research centers in the region can run only selected aspects of the GCM models. However there is also uncertainty related to resolution. By working together, several regional institutes are attempting to address these challenges and build on their comparative strengths. Determining the scope of the Arab domain is a sensitive scientific issue and is being coordinated among governments and research institutes within the framework of the UN regional initiative. Capacity building is needed to train senior water staff, to downscale GCMs to RCMs and to do basin level modeling.

Sea Level Rise (SLR) and Disasters: Sea level rise estimates in next IPCC reports are likely to be more pessimistic than previous reports. We already know that most disasters are related to water events. However, while economic costs are increasing, the loss of human lives is decreasing. Sea level rise could affect 43 cities in Arab world with a threatening sea-water rise. Just one-half meter rise means millions of people in the Arab region are likely to be displaced. Climate resilience is thus linked to disaster risk reduction measures and to better water management. Regardless of what climate change will bring, or what may be causing it, these water management investments are needed. Such water investments are the best "no regrets" strategy for adapting to climate change. A new analysis of the link between climate change and disasters is being released by IPCC soon.

Alternative energy: Some participants suggested that nuclear power can provide energy solutions with no greenhouse gas and with fossil fuel saving. It deserves to be considered as alternative especially for water desalination. However, the group was reminded that nuclear power needs cooling that might be physically unaffordable and this needs careful consideration.

UN Egyptian partnership: As part of its strategy to adapt to climate change, the Egyptian government has partnered with the United Nations to assess specific needs related to climate-sensitive development. The Climate Change Risk Management Program, as it is referred to, includes components focused on forecasting, integrated water resources management, a Regional Circulation Model for the Nile River, and a socio-economic study on major sectors in the country. It looks at the water challenges that Egypt faces, sea level rise (SLR) and socio-economic impacts of projected changes in temperature and Nile flow using different models. The outputs of the RCM for the Nile water upstream flow was more refined than that of the GCM and it reduced the uncertainty bandwidth.

Act now: Uncertainty in climate change modeling will always exist. The key is: what to tell the decision maker. There was a strong sense that the cost of inaction is high and we need to act today. The climate change challenges need to be addressed through innovation, science and technology, and investment. Integrating scientific knowledge into decision-making is critical. Countries must overcome just having exerts talking to experts.

To build the political will and capacity to respond to these growing challenges, stakeholders in the region must achieve a shared understanding of the causes, consequences, and strategies for adapting to climate change. They must share understanding of; how the uncertainty of current climate change models relates to decision-making; ways to deal with uncertainty and decision making; the scarcity of data, lack of enforcement, and; lack of responsive governance arrangements. The region must involve civil communities in policy making.

Examples outside the Region: It was noted that the US State of California passed a Global Warming Act that put in place standards higher than any international standard and a cap and trade program. California reviewed a wide body of science on climate change and then took political action into 2007. The water sector is a huge energy user in California; the state is hydrological and physically connected which allows a number of managed options like water banking and water marketing to manage water under the uncertainties of climate change. However climate change made it imperative for the state to act. The lessons were; we need to embrace new ways of thinking about water planning and management; legislation was important to set clear goals; mitigation must go with adaptation. California has taken new approach that is referred to as non-stationary. It is an approach that looks at a range of probabilities[1].

Debatable Issues

Along with general agreements, disagreements were raised. For examples, there are gaps between the funding needs of agreed projects and the money allocated to them by different Arab countries and financial institutions to those projects. Sea Level Rise estimations are controversial and need more study to account for effects of increasing the cultivated area and dams building. Experts disagree in comparing different RCM models. Developed RCMs did not properly consider previous attempts at climate modeling in the region. Some felt that monitoring climate change impacts can be estimated using advanced monitoring equipment. Others disagreed because of a lack of accurate tools and forecasting methods. Indeed many felt that social and economic aspects were not considered. There was debate over the use of funding for modeling or in building institutions capacity to provide services to the community for adapting to climate change.

Priority Solutions

The presentations and discussions in all sessions related to theme 2 identified number of actions/solutions that can contribute in effective improvements the state of water and food security in the Arab (appendix 2). Through an active debate and free voting during the wrap-up meeting the participants identified the top priority solutions in the following order:

1st Priority Solutions

Encourage political leaders, water managers, and researchers in the Arab region to make the necessary investments to build their own GCM (not just RCM) models and to use the outputs of the ongoing climate change modeling projects of all working agencies in the Arab region such as UNESCO, ESCWA, UNEP and UNDP.

2nd Priority Solutions

[1] refers to the huge practical debate in the statistics in hydrology

1. Promote collaboration within the water community to develop new tools for decision-making under uncertainty
2. Develop a regional framework for water security and climate Change
3. Include climate change impacts in master plans, harmonize master plans for water use in all sectors, and engage NGOs, the private sector, and civil society in planning processes

3rd Priority Solutions

1. Establish mechanisms within the Arab countries to enable more intensive and extensive dialogues between the climate scientists, the water community, and civil society
2. Integrate adaptation into all water projects and across all sectors of planning
3. Strengthen the capacity to deal with the uncertainty caused by climate change – in terms of policies, institutions, and decision-makers

Theme3: Sustainable and Fair Solutions for Trans-boundary Rivers and Groundwater Aquifers

Cooperation necessary: Much of the water in the Middle East stems from a number of international waterways and of mostly non-renewable shared groundwater aquifers. Sixty five percent of the Arab countries surface water starts outside their political borders. Droughts, which may increase, negatively impact the Arab region and affect the shared river basins and aquifers. Mutual reliance on these sources has made water a catalyst of conflict, as in the case of the Iran – Iraq war and Arab-Israeli conflict.

On the other hand, the shared rivers highlight interdependence of the countries. This interdependence is real and it means that conflict and cooperation actually co-exist. Economic interdependence is high. Understanding environmental interdependence through climate change is just emerging. Consequently, knowledge sharing among decision makers is forcing more interdependence than ever before. The region must build mechanisms and agreements to mitigate risk, to build regional investments and to share benefits on win-win and no-harm principles.

How do we understand the word cooperation? All factors must be considered together but how will we determine weight of the factors? Most of water sharing agreements in the region was signed in colonial periods. This raises a question: Are the international agreements binding after changes in leadership? How should we look toward the future?

The Arab region should play a leadership role in the world on managing water scarcity and trans-boundary waters. While coordinating uses of trans-boundary waters is critical to the region, the link between experts and politicians, which is central to coordinating needs and balancing interests, is weak and must be improved.

From conflict to cooperation and hydro diplomacy: There was strong agreement that water should help the region move from conflict to cooperation. However, the speeches and workshops revealed differences on how to practically achieve this goal. Many shared water basins in the region do not have enforceable water sharing agreements and ongoing tensions persist between the riparian countries. Since arid countries are likely to suffer the most from climate changes enforcing sharing rules in the Arab region is critical.

The UN will establish 2013 as the year for water cooperation and diplomacy with the purpose to connect water to peace building. UNESCO is developing a code of conduct for hydro solidarity and a new center for water diplomacy in the Arab region is being suggested. The Arab league initiated a network, similar to the UNESCO hydro–diplomacy, of Arab water ministers and is establishing a regional water data base.

While rivers can be catalyst for cooperation or conflict conceptions of physical aspects of scarcity behind these debates are often inadequate. It is hard for one country to manage without knowing what the other country is doing. One country cannot establish authority for whole basin. Each basin is different so each needs its own conventions based on international principles.

United Nations Convention on non-navigable Waterways: The UN non-navigation uses convention of 1997 is a key to achieving water sharing. However, it took many years to develop the convention and this suggests that it may be easier to achieve basin agreements then the general international conventions. To date, only 24 countries have ratified it and ratification requires 35 countries. Three countries abstained but became part of the convention. However, 4 of 8 Arab countries who signed the convention do not have shared rivers or even rivers.

While the 1997 UN convention is not fully ratified, general agreement exists on its basic principles which reflect customary international law and are recognized by International Court of Justice. Even non signers such as Pakistan and India, used such principles in their recent Indus river dispute. There are three principles: Equitable and reasonable manner; prevention of significant harm; and pre-notification.

In defining watercourses, the convention only includes surface water and groundwater connected to surface water. The international law convention is really a law of cooperation. There are different definitions used such as watercourse, basin, or watersheds which stand behind disagreements and reluctance of many countries to ratify the convention. In addition, the question was asked about what about rain water that does not reach the water course and creates local direct economic benefits.

Article 3 of the convention refers to water courses while ignoring other sources such as groundwater and rainfall. Article 5 focuses on equitable uses and Article 7 states countries should do no harm. Upstream countries tend to honor article 5 while downstream countries tend to honor article 7. Article 8 refers to the sovereign equality and territorial integrity of states.

Each of the articles imposes basic rights and obligations. Today, the prevention of significant harm is a principle in many aspects of international environment law. International law is now stuck on how to integrate the two other principals. The convention seems to resolve the two clauses in favor of using equitable utilization. Today two new principles are emerging: 1) protection of eco system of international water courses, and; 2) mechanism for resolving disputes.

Downstream countries would like to see the convention refer to all river basin water resources. In absence of dispute mechanisms, negotiations often degenerate into zero sum games. Clearly hydro diplomacy which focuses on building trust is needed in the region.

Trans-boundary Aquifers: To date, trans-boundary aquifers have received little attention. However, some agreements have emerged. There is a UN General Assembly (UNGA) Resolution 63/124 on the Law of Trans-boundary Aquifers. However, it is not yet a convention. It calls for the protection of groundwater in context of optimal use of water for sustainable development. Since groundwater is more susceptible to socio-economic and legal considerations, it calls for sound management and preservation of eco system, control of pollution and protection in time of armed conflict. The draft does not include articles on dispute resolution. Sovereignty exists for the part of the aquifer within the boundaries of country; subject to international law. The UN draft articles on aquifers uses basins instead of water courses and emphasizes on the necessity of data exchange between riparian countries.

Benefit sharing: In the end, trans-boundary water processes are political processes. Actually, the concept of benefit sharing may be more politically acceptable then sharing of actual river water. There are several types of benefit sharing, such as: benefits to river; benefits from river; reducing costs due to the river, and; increasing benefits beyond the river. Mechanisms to achieve such benefits range from informal sharing, to formal cooperation, to joint actions and more. Cooperation can exist without sharing all types of benefits. Given the realities in Arab country basins, it makes sense to promote cooperation of any sort. Actually, lack of normal indicators of cooperation may be misunderstood as evidence that cooperation does not exist.

In the end international laws are not enforceable. Countries can not comply with treaties unless treaties are self enforcing. Agreements must be seen by countries as tools for them to exercises their authority versus being seen as reduction of their sovereignty.

Green and Blue Water: Criteria for measuring water to determine water needed for each country is necessary. The concept of green and blue water was put forward as a way to achieve more equitable distribution of benefits along water courses. For upstream countries the green water is most important and for downstream countries the blue water is most important. The point was made that benefit sharing should focus on both green and blue water instead of fighting only over the blue water. Looking at both types of water could change how countries see fair and equitable use of water. For example, in the Arab region most of the blue water comes from outside the region while green water stays with countries in the upper catchment outside the region.

This distinction between blue and green water points to the difference of focusing on the Nile river course versus on the Nile river basin. Since people in the basin depend on the two types of water, the suggestion was made that the basin countries should look at the per capita use of both green and blue water in all water use sectors to get more fair and equitable agreements. The concept asks, does equitable and reasonable water use mean water of the river or water of the basin?

The green – blue water concept elicited an important discussion in the forum. The concept had strong supporters who felt that the green and blue water distinction was a good intervention because we need to find other sources.

Nile basin: A long history of technical cooperation exists between the countries in the Nile basin. Technical cooperation between the riparian countries of the Nile River is an example of good practices. Recent attempts to develop a legal framework could not be finalized. Significant progress was made on agreement of its terms except on those related to equitable shares and prior notification. The Nile basin countries still seems to lack confidence to build win –win solutions and the basis of political will for trans-boundary waters management.

Debatable Issues

Some participants questioned whether it helps to put the argument in terms of blue and green water. Others disagreed that the Nile Basin Initiative (NBI) was founded on an incorrect

basis because it did not recognize all water types in the basin. Some expressed disappointment that the problems of the river Jordan were not presented as part of this dialog.

Priority Solutions

The presentations and discussions in all sessions related to theme 3 identified number of actions/solutions that can contribute in effective improvements the state of water and food security in the Arab (appendix 3). Through an active debate and free voting during the wrap-up meeting the participants identified the top priority solutions in the following order:

1st Priority Solutions

- Use shared water resources as a tool for cooperation and peace, and promote the equitable allocation of water resources

2nd Priority Solutions

1. Promote and support more cooperation and integration among countries in the Nile River Basin

2. Develop and implement a regional treaty to establish a legal framework that accounts for fair sharing, joint development, joint vision, and seeking pre-approvals on new water related projects

3. Raise awareness and participation of Water User Associations,

4. Side Events

A. Coordinating a Target in the Thematic Process of the 6th World Water Forum

The Arab Water Council (AWC) is mandated by the International Forum Committee (IFC) to coordinate Target VI of the thematic priority 2.2 (Contribute to food security by optimal use of water) of the 6th World Water Forum (WWF6). Target VI is concerned with the development and adoption of at least two regional visions by 2015, optimizing water use in agriculture for food security and 200 sub-regional sustainable agricultural plans by 2025". A multi-stakeholder target and solution group coordinated by AWC is identifying worldwide solutions and commitments for target VI and developing a rationale and action plan for the target.

The AWC used the side event to present the draft target report for submission to the WWF6. Solutions identified by the 2nd Arab water forum lend themselves to contribute to Target VI. Through coordination with the regional process, the Arab region is a candidate to be one of the two regions to develop regional vision for optimal use of water for food security and many of the Arab countries could be engaged in developing action plans.

B. Arab Cross Regional Process

The Secretariat of the Arab Water Ministerial Council is coordinating two cross-continental processes of WWF6. A technical committee was established to identify the regional priorities and targets. A special side event was organized during the 2nd Arab Water Forum to further discuss the implementation of the Arab regional process and to identify the coordinators and the supporting teams. The Arab Water Council was appointed as coordinator of priority target 1 which anticipates that by 2020, water use efficiency will be raised by 10 to 15 % for meeting increased water demand and ensuring water and food security for facing the future challenges in accordance with the available water resources and the principals of sustainable development".

C. African Ministers Council on Water: Monitoring and Evaluation Water Indicators

North African ministers and their representatives met to discuss monitoring and evaluation Water Indicators. Several other topics were also discussed, including trans-boundary basin plans. Results of the discussion will provide input to the Ministerial Process of the 6th World Water Forum.

Participants described the state of management of water resources in North Africa. A framework of indicators to monitor and evaluate water resources in the Arab region and Africa was presented. Preparation of M&E systems at all levels was discussed.

It is critical to facilitate cooperation between North African countries through some common projects. Countries in the region should launch the measuring of some indicators in countries where it is appropriate, noting that some indicators are likely to be inapplicable in some countries. In addition, the methods for collecting data must be adapted to the size and needs of particular countries.

There is some disagreement over the temperance of some indicators. Also the applicability of some indicators for some countries was questioned.

5. Key Policy Messages of the AWF

Securing Basic Human Needs

- The Arab region is becoming water insecure; the gap between demand for water use and supply will increase.
- Investments in agriculture must be a strategic public policy priority and harmonized with the water security strategy of the Arab League, the Arab Water Council's vision, and regional organizations with a similar food and energy strategies.
- Food production within the region must be balanced with food imports
- Non-conventional water resources such as treated wastewater, saline brackish water, drainage water, desalinated water, and artificial groundwater recharge with fresh and treated wastewater will be important to achieving food and water security for the region
- Resource protection is cost effective because in the long term it reduces the investment needs for expansion of the water supply systems and also for costly water treatment measures and facilities.
- Countries may need to change how water is economically valued within their cultures.
- Treated wastewater is acceptable in the region.
- Water and sanitation are human rights; however large disparities in access to water and sanitation remain in many areas of the Arab region.
- An investment in sanitation return nearly 9 dollars per dollar invested.
- Poor water governance means high costs to Arab countries in the face of water scarcity.
- Better water governance is hard to achieve when many countries of the region lack democratic practice.
- Public awareness of water options and their impacts must increase to help manage demand for water.
- Applications of science and technology are the key forces for producing more with less water.

Climate Change

- The Arab region needs a framework for water security and climate change.
- Water investments offer the best "no regrets" strategies to help countries in the region adapt to climate changes; they are needed regardless of causes or extent of climate changes.
- An Arab water fund should be created to support these security and climate change needs.
- The Arab region needs to develop its own climate models; the IPCC Global Circulation Models (GCM) are not applicable at the regional scale in the Arab region.

- Climate change is likely to produce around a 50% water gap in the Arab region and that means that the region will have to import more food and use more desalination along with other methods.

Trans-boundary Waters

- Shared water issues must be priorities in the development strategies in Arab countries if they are to realize peace and stability.
- Water diplomacy must be promoted as a tool for sustainable peace.
- The Arab region should play a leadership role in the world on water scarcity and trans-boundary water.
- Interdependence within the Arab region is real and water should help the region move from conflict to cooperation
- Trans-boundary water processes are political processes; agreements must be seen by countries as tools for them to exercise their authority versus being seen as a reduction of their sovereignty.
- More comprehensive criteria for measuring water to determine water needed for each country is necessary.
- The Nile basin countries still lack confidence to build win–win solutions and political will for trans-boundary waters management.
- The linkages between politicians and experts on water issues in the Arab region must be improved.

6. Identified Commitments

During the AWF participants made several commitments. These commitments include the following.

1. Several participants committed to providing or improving feedback on Arab region priorities for the next phase of the International Hydrological Program.
2. UN agencies commit to integrate other information systems into the UN-Water Activity Information System (UNW-AIS) and adapt the information systems to the specific needs of the MENA Region.
3. The World Meteorological Organization is committed to establishing the Global Framework for Climate Services (GFCS) and to generating the information needed for improved decision-making in the face of climate change.
4. GIZ commits to five working groups on five topics to answer three main questions;
    a. In which of the MENA countries is climate change relevant?
    b. How to enable the institutional framework at the national local level?
    c. How to enhance the involvement of civil society?
5. AWC and other Arab based organizations commit to a scale-up coordination in addressing water challenges and adopting solutions.
6. To help decision makers implement fixable adaptation policies to under different scenarios of climate change.
7. To help decision makers generate mechanisms of coordination between water and agricultural sectors to draw up plans that cope with climate change phenomenon.
8. CEDARE and AWC will finalize the preparation of the Second Arab State of the Water Report and to launch it in 2012.
9. The Egypt Ministry of Water Resources and Irrigation is committed to the use of treated wastewater, drainage water, and artificial groundwater recharge.
10. King Fahd University, Miahona, KSA and Al-Azhar University, Egypt are committed to promote good practices of the use of treated wastewater.
11. The International Centre for Bio-saline is committed to the use of saline/brackish water and to develop more salt tolerant varieties for agriculture.
12. The CIHEAM, IAMB Bari training Institute, Italy commits to promote using non-conventional water resources in irrigation.
13. Participants commit to making rainwater harvesting an agenda priority of policy makers and to include rainwater harvesting in water resource planning
14. Participants are committed to promote knowledge sharing and management on non-conventional sources at the global level.
15. The hydrology program of UNESCO Cairo is committed to assist in strengthening water research, water resources management education and capacity-building in the Arab region.
16. ACSAD, Syria is committed to carry out more R&D work to combat drought and develop capacity building training on how to cope with drought.
17. The Arab Water Council and the Arab League (Centre for Water studies, and Arab Water Security), are promoting peace and cooperation in the region, defending water rights, developing capacity building programs, establishing legal framework for shared basins and aquifers and promoting popular diplomacy and hydro-political solutions.

18. Coca Cola commits to sharing PPP experiences of the UNDP &Coca Cola Foundation project in Tunisia and to coordinate with other regional organizations that work in the field.
19. The Government of Egypt commits to providing the right environment for implementation of PPP policy frame work
20. The Secretariat of the Arab Water Ministerial Council, the Arab Water Council and other Arab based organizations establish a working committee to coordinate the participation of the Arab region in the 6th World Water Forum.
21. The Arab Water Council is committed to coordinate Target VI of the thematic priority 2.2 Contribute to Food Security by the Optimal Use of Water for the 6th World Water Forum

7. The Way Forward

The region should play a world leadership role on water and scarcity. The presentations, the deliberations, the agreements and disagreements of more than 400 participants of the 2nd Arab Water Form established a common platform of understanding for launching actions for sustainable life under water scarce conditions in the Arab countries. The outcome is owned by all stakeholders who expressed commitments to achieve this goal. The AWC is committed to widely disseminate and share the information and knowledge and follow up on the implementation of the recommendations guided by the many innovative, proven and ground-tested solutions that were identified during the form.

The outcomes of the 2nd Arab water forum are major regional inputs from the Arab world into the 6th World Water Forum and Rio +20 and other international forums. Both events will be considered as opportunities to create more support and enabling environment to move forward with more clear vision and sustainable action plan to solve the water problems in this region.

Appendix 1

Solutions Identified for Theme 1: Securing Basic Human Needs: Water, Food, and Environment for Sustainable Development

1. Implement integrated approaches -- treated wastewater, rainwater water use efficiency, groundwater recharge, conjunctive use, demand management
2. Improve water use efficiency
3. Provide food security to promote political and economic stability
4. Employ new methods to enhance tolerance to drought
5. Use new crop varieties to enhance water productivity (e.g., Syria)
6. Link research with development to produce more food with less water
7. Adopt the measure of productivity per unit of water (not land);
8. Increase resistance and tolerance to pests via biotechnology
9. Transfer technology to communities and end-users
10. Use more treated wastewater
11. Provide more technical education for graduate and post-graduate students
12. Implement policies that integrate food, subsidies, and water storage
13. Cover the actual costs for water deliveries
14. Promote Islamic values for conservation
15. View the Mediterranean Sea as a major food basket
16. Reduce water waste
17. Promote regional cooperation/mutual interests to achieve water and food security
18. Move away for water-intense uses
19. Invest more in the agricultural sector
20. Create national councils for sustainable policies and practices
21. Climate change needs research and institutional climate change adaptation studies;
22. Find new ways to involve civil society in decision-making and action
23. Create an Arab Centre for Water and Food Security
24. Implement the existing Arab water strategy via action plans
25. Improve the management of existing supplies via scientific and technological innovations
26. Increase the capacity of rural people – especially women – to manage available water resources
27. Employ more cost-effective water conservation and water use efficiency strategies;
28. Make investments in agriculture a strategic public policy priority
29. Integrate the water strategy of the Arab League and Arab Water Council with food and energy strategies
30. Use science-based technological change to promote and support sustainable intensification of agriculture
31. Trade goods and services across countries based on comparative advantages
32. Reallocate subsidies to water saving crops
33. Establish and enforce water rights
34. Exchange experiences and lessons via the Arab Water Council
35. Access global best practices by visiting the 6th World Water Forum *Platform of Solutions*

36. Promote and support networking and capacity building simple but widespread technologies such as cell phones
37. Build capacity development by providing water information
38. Make information accessible via a single, simple to use point of access
39. Create strong linkages with policy makers to scale-up and scale-out rainwater harvesting
40. Rainwater harvesting technologies and training need to be updated
41. Supplementary irrigation is a viable solution to cope with climate change
42. Document and share successful case studies of water harvesting in Egypt, Syria, Sudan, Jordan, and Tunisia
43. Aim at zero waste water by adopting proper management techniques
44. Develop low cost-low energy consumption technology for treated wastewater and desalination
45. Develop locally-based technologies and encourage collective efforts to plan, develop, operate, and maintain non-conventional energy sources (wind, solar, etc.).
46. Develop a national water atlas and national plan
47. Develop a simple set of core indicators and monitoring system for all countries
48. Improve water demand management
49. Increase awareness of water use by the public
50. Reduce the environmental impacts of desalination, and/or rely on alternative sources of water
51. Integrate green water into water balance assessments
52. Create extra water storage through injection of groundwater with desalinated water
53. Analyze policies looking at basin level, return flows, and overall water use efficiency -- rather than just on-farm irrigation efficiencies -- to ensure equitable distribution among farmers
54. Control groundwater abstractions and encourage micro-irrigation
55. Promoting green economy in the Arab region depending on sustainable management of water resources and on safe and sustainable provisioning of water supply and adequate sanitation services

Appendix 2

Solutions Identified for Theme 2: The Risk of Climate Change on Water: Between Uncertainty and Cost of Adaptation

1. Encourage political leaders, water managers, and researchers in the Arab region to make the necessary investments to build their own GCM (not just RCM) models and to use the outputs of the ongoing climate change modeling projects of all working agencies in the Arab region such as UNESCO, ESCWA, UNEP and UNDP.
2. Build the capacity of public officials and water managers to deal with climate change and water
3. Respond to the needs of climate information for the water sector through the Regional Climate Centers being established under the Global Framework for Climate Services
4. Foster cooperation among all Arab countries; regional partnerships are critical to respond to climate change, water security, and associated disasters
5. Promote collaboration within the water community to develop new tools for decision-making under uncertainty
6. Establish mechanisms within the Arab countries to enable more intensive and extensive dialogues between the climate scientists, the water community, and civil society
7. Recognize and accept that the past is no longer a good indicator for the future
8. Enhance the knowledge base of climate change impacts and vulnerability
9. Develop the capacity to map and model risks/hot spots, along with policies and institutions that are more responsive, robust, and adaptive in the face of uncertainty
10. Promote proactive responses to risk management, and don't rely exclusively on reactive responses
11. Integrate adaptation into all water projects and across all sectors of planning
12. Promote market-based incentives and insurance
13. Mobilize and engage private sector participation in planning, developing, and managing a more resilient water infrastructure
14. Develop a regional framework for water security and climate change
15. Encourage the use of non-conventional water sources
16. All countries in the region should develop and implement IWRM plans
17. Need to refine and downscale climate data information to the local level
18. Need model legislation, human resource development and training
19. Create participation incentives for the private sector
20. Share best practices and new technologies across countries
21. Include climate change impacts in master plans, harmonize master plans for water use in all sectors, and engage NGOs, the private sector, and civil society in planning processes
22. Need regional and national monitoring information systems
23. Need policy to encourage public-private partnerships
24. Encourage shared water consumption projects
25. Involve all parties at all stages of planning, design, and implementation of donor- funded climate change programs
26. Implement adaptation policy to help the decision makers under different scenarios of climate change
27. Generating mechanisms of coordination between water and Agricultural sectors to draw up plans that cope with climate change phenomenon.

28. Strengthen the capacity to deal with the uncertainty caused by climate change – in terms of policies, institutions, and decision-makers
29. Build the capacity of local institutions and leaders
30. Link national and local communities by building a communication platform

Appendix 3

Solutions Identified for Theme 3: Sustainable and Fair Solutions for Trans-boundary Rivers and Groundwater Aquifers

1. Use shared water resources as a tool for cooperation and peace, and promote the equitable allocation of water resources
2. Promote and support more cooperation and integration among countries in the Nile River Basin
3. Develop and implement a regional treaty to establish a legal framework that accounts for fair sharing, joint development, joint vision, and seeking pre-approvals on new water related projects
4. Establish an Arab Council of Water Ministers' mechanism to encourage cooperation and negotiation
5. Promote and support better risk management planning for short and long term to combat the drought.
6. Adopt drought responses to avoid land degradation and loss of productive lands
7. Develop capacity building program and develop more research on how to reduce the negative impact of drought
8. Establish a regional technical council.
9. Ensure and expand public democracy as a tool for reducing conflicts over transboundary water resources. This will automatically improve all water governance pillars.
10. We need to change to improve water governance in Med countries to feed a construction on the adaptation of governance to future challenges through analysis of the different systems in Mediterranean countries and identify bottle neck and balance uses and resources and combine bottom-up and top=down approach (No "one size fits all")
11. Reduce government interference in water markets and apply better governance standards in order to expand the involvement of private sector.
12. Raise awareness and participation of Water User Associations, political will, and public participation
13. Amend 1997 UN Convention to embrace the river basin/green-blue water approach rather than the watercourse blue water only approach
14. Change the 1997 UN convention ratification process so as to involve countries of relevance -- i.e., countries with shared rivers
15. Promote water cooperation and diplomacy among all water sectors in a given region as strategic tools for sustainable water recourses management

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