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Water in the GCC... Towards Economic Efficiency and Financial Sustainability

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Preface

The GCC countries are situated in one of the most water scarce regions of the world and have one of the lowest per capita share of freshwater resources globally, with values much below the threshold of absolute water scarcity of 500 m³/year. In the last few decades, the GCC countries have witnessed an accelerated socio-economic, agricultural, and industrial development growth, which was associated with substantial increase in water demands. To provide these water demands, the GCC countries have primarily focused their efforts on the development and supply augmentation aspects of water management, manifested by development of groundwater, installation of desalination plants, expansion in the reuse of treated wastewater, in addition to dams construction.

To meet increasing domestic water demands, the GCC countries have resorted heavily to desalination. Currently, almost all of the municipal water supply systems rely on desalination in the majority of the GCC countries. However, desalination is associated with substantial financial cost and are energy-intensive affecting both the economies and the environment of the GCC countries. In addition to the challenges of meeting the rapid growth of municipal water demands, rates of per capita domestic water consumption in many GCC countries are considered excessive and are ranked among the highest in the world. This is attributed mainly to the provision of high quality domestic water supply service coupled with very heavy blanket non-targeted subsidies, which gives the consumers the false impression of water abundance.

To fulfil the requirements of agricultural water demands, the GCC countries have relied on groundwater resources and to a lesser extent on treated municipal wastewater. A major concern is that the majority of groundwater resources in the region are non-renewable and are being extensively mined and rapidly depleting. Furthermore, renewable groundwater resources are being over-exploited beyond their replenishment rates leading to quality degradation due to saltwater intrusion. The loss of groundwater resources assets will have dire consequences on the GCC countries in terms of the loss of a long-term strategic water supply and the cost of the replacement water. Groundwater excessive withdrawal is attributed to many factors, the most important is poor irrigation practices with irrigation efficiencies ranked among the lowest in the world. Some of the reasons for such practices is inadequate monitoring of groundwater abstraction and absence of charges for groundwater withdrawal, providing no incentive for water conservation.

Notably, to meet the ever-increasing demand for water, the GCC countries have adopted a supply-side management approach for securing water supplies. This has forced the countries, increasingly, into more expensive and costly investments in water supply sources and infrastructure. The heavy financial, economic and rising environmental costs associated with such approach cannot be over-emphasized. Clearly, such approach cannot be a long-term solution to water scarcity in the GCC countries, and a new conceptual approach in managing the countries' limited and costly water resources will be required. The GCC countries will need to shift their emphasis from ensuring "**sustainability of supply**" to ensuring "**sustainability of consumption**", while achieving economic efficiency and financial sustainability as core objectives.

To achieve such shift, there are basically three types of policy instruments that can be implemented: structural & operational (e.g., metering, retrofitting water saving devices, flow control, recycling,), sociopolitical (e.g., education and awareness, building codes, appliances labeling,), and economic (incentives and disincentives). In this regard, economic policies instruments are more effective in achieving economic efficiency and financial sustainability and can complement and reinforce the use of the other two policy instruments.

In general, economic instruments involve the use of prices and charges to provide incentives to water users to utilize water efficiently and rationally. The purpose of water pricing policies is three-fold: 1) cost reflectivity (signal to users the true scarcity value of water and the cost of service provision as an incentive for more efficient water use); 2) environmental and resource protection (encouraging conservation and efficient use and recognizing environmental co-benefits); and 3) cost recovery (generation of revenues for the efficient operation of the present system, its maintenance, modernization and future expansion). A properly designed water pricing policy will direct subsidies towards guaranteeing water as human rights and that pricing is set proportional to volume of usage with heavy water users paying the most to achieve social equity.

On the other hand, one of the main problems threatening the sustainability of the water services in the GCC countries is the low cost recovery. Although water supply utilities in the GCC countries are considered among the top-ranked service providers in the world, the existing very high rates of subsidies result in very low cost recovery percentages. Moreover, unlike the water supply utilities, the wastewater sector in the majority of the GCC countries has literally zero cost recovery due to the absence of wastewater tariff for collection, treatment, and reuse. This creates a heavy financial burden on the countries fiscal budget, and holds the sector captive to government allocations, which are susceptible to oil-prices volatility, eventually influencing the general water services performance.

One of the measures that have been taken towards reducing the cost and alleviating the financial burden of water services is privatization. The majority of the GCC countries have moved to privatizing production where many desalination plants are built as independent water and power projects (IWPP), with desalinated water purchased by the government through a long-term plan. Still, the municipal water sector can benefit from the many advantages privatization can offer in the whole water supply chain, which has not been adequately investigated in the region yet.

The WSTA 14th Gulf Water Conference is advocating for a paradigm shift in the management of water resources in the GCC countries to move from the current emphasis on supply sustainability approach to a consumption sustainability approach, with its core objectives of economic efficiency of water uses and financial sustainability of water services. Moreover, the conference deliberations and results will be the GCC countries contribution to the selected UN Water topic for 2021 “Valuing Water” and for 2022 “Groundwater: making the invisible visible”.

The WSTA 14th Gulf Water Conference is organized in the Kingdom of Saudi Arabia in collaboration with the Saudi Ministry of Environment, Water and Agriculture. The conference is organized in close coordination with the GCC Secretariat General and with sponsorship by the Arab Fund for Economic and Social Development (AFESD) and the Saline Water Conversion Corporation (SWCC). The conference is supported and endorsed by the active UN organizations in the region of UNESCO Cairo Office, UN-ESCWA, and FAO; and the international and regional organizations of IWMI, ICBA, IDA, AGU, OWS, and EDS.

On behalf of the Conference Scientific Committee, I would like to thank all authors and panelists from various parts of the world for joining us in our Fourteenth Gulf Water Conference and sharing their experiences and innovative solutions in improving water sustainability and overcoming the water challenges in the arid GCC and Arab countries.

Furthermore, we would like to express our thanks to the *Desalination and Water Treatment* Journal Editor, Miriam Balaban for giving us the opportunity to publish selected papers presented at the conference.

Prof. Waleed K Al-Zubari,
Chairperson
Conference Scientific Committee

Conference Objectives

Reviewing current policies and strategies related to economic efficiency and financial sustainability in the water sector in the GCC countries.

Informing policy and decision-making on the impacts of the use of economic instruments to achieve sustainable water consumption patterns in the GCC countries.

Identifying challenges and opportunities in implement-

ing economic instruments to achieve sustainable water consumption under the prevailing socio-economic, environmental, cultural, and political conditions in the GCC countries.

Exchanging experiences and best practice case studies in the GCC countries and other countries in the region on achieving economic efficiency and financial sustainability in the water sector.

Conference Recommendations

On Achieving Water Sector Economic Efficiency and Financial Sustainability

1. To achieve high levels of security and sustainability of the water sector, the GCC countries need to shift their focus from ensuring the “**sustainability of supply**”, which is currently prevailing in most of the water sectors in the GCC countries, to ensuring “**sustainability of consumption**”, which can be achieved by moving towards the approach of “demand management, efficiency, and conservation”. In this regard, economic tools (incentives and disincentives) represent the most effective tools for such transformation and to achieve economic efficiency and financial sustainability compared to the socio-political and structural-operational tools, and they can complement and reinforce them.
2. To incentivize the private sector to participate in the provision and management of water services, that is, in the entire water supply chain, which is expected to contribute to reducing the costs of water services and management and raising the levels of cost recovery, thus contributing to the financial sustainability of the water sector. However, this must be under a high-level and independent regulatory and supervisory system; experiences of some GCC countries in this field and the lessons learned to be disseminated.

On Desalination

3. Desalination represents the main source of drinking/ domestic water, and its sustainability is an essential foundation for water security in the GCC countries. Therefore, there is an absolute necessity to enhance the joint GCC efforts to localize the desalination industry and increase its added value to their economies, including joint investment and manufacturing of spare parts and consumables, and coordinating research and education and training programs at the level of the GCC and Arab countries.
4. Intensifying research efforts in the field of reducing financial, economic costs and environmental costs of desalination, investment opportunities in desalination reject, and developing unified key indicators for the performance and operation of desalination

plants and the desalination sector as a whole in the GCC countries.

On Surface Water and Groundwater

5. Improving groundwater reserves through managed aquifer recharge (MAR) various schemes (Aquifer Storage and Recovery, Aquifer-Storage-Transfer-Recovery, Soil Aquifer Treatment, rainfall harvesting), while taking into account health and environmental risks when using treated wastewater and the purpose for which it is stored, in order to assist in efforts to rehabilitate aquifers and to provide a strategic reserve of groundwater for emergency conditions, or for other uses such as meeting the requirements of the agricultural sector.
6. Regulating the use of groundwater basins through enacting and implementing comprehensive legislation that reaffirms the state ownership of groundwater and considers well owners as water users, establishing an appropriate institutional mechanism for stakeholder participation, and implementing economic stimulus tools by imposing appropriate tariffs on groundwater use on the basis of its economic value in order to provide a price-signaling mechanism and to raise awareness of the value of groundwater to aid groundwater rehabilitation efforts.
7. Maximizing surface water utilization through the development and implementation of rain and flood water harvesting programs to mitigate and take advantage of extreme events caused by climate change.

On Municipal Wastewater

8. Increasing wastewater collection rates, raising treatment levels, and maximizing reuse rates in the appropriate sectors through integrated strategies and plans for its reuse, developing required health and environmental risk management plans for the treated wastewater reuse, and motivating the private sector to use this renewable source through appropriate economic incentives.
9. Support research and development efforts related to maximizing wastewater utilization in areas other than irrigation, such as waste-to-energy programs and the beneficial use of sludge in the fertilizer industry.

10. Ensure the separation of medical wastewater (i.e., those generated from medical institutions, such as dispensaries, hospitals and medical complexes) from domestic wastewater, as well as educating the public not to dispose pharmaceutical wastes into domestic sewage systems (as well as chemicals), to reduce the possibility of transferring pharmaceutical substances, hormones and other medical substance into treated wastewater when reused.
11. Conduct research on the possibility of the transfer of emerging substances and compounds such as pharmaceuticals, hormones, heavy metals to plants when reusing treated wastewater in the final product in the long run.

On Municipal Water Management

12. Achieving best practices and international standards for drinking water supply and sanitation utilities in the GCC countries, which include customer satisfaction, service quality, capacity development and leadership programs, rationalization of operation and resilience, financial sustainability, infrastructure stability, and environmental commitment.
13. Management of non-revenue water levels in accordance with best international best practices and benchmarks to enhance the efficiency of municipal water supply and reduce its costs to contribute to enhancing the financial sustainability of municipal water supply utilities.

On Agricultural Water Management

14. Raising irrigation efficiency through the use of modern farming and irrigation systems and techniques and adopting smart farming systems and selecting drought- and salt-tolerant crops appropriate for the region.
15. Supporting research and development efforts to enhance water productivity and water efficiency in the agricultural sector, and integrating drylands-desert farming curricula into academic and vocational programs with the aim of reducing overall water consumption in the agricultural sector.
16. Providing farmers with incentives and appropriate training to adopt modern farming systems, and support their participation in the decision-making process, with the aim of raising their awareness and facilitating the implementation of administrative procedures.

On Industrial Water Management

17. Increasing water use efficiency and demand management in the oil and industrial sector, and enforcing industrial wastewater treatment and reuse programs through the enactment of appropriate legislation.
18. Ensuring that industrial wastewater is not discharged

into the municipal wastewater collection networks by formulating and enacting necessary legislation as well as in the general land use planning and zoning.

On Addressing Climate Change Impacts

19. Inviting and encouraging governments, research institutions and researchers to benefit from the technical outputs of the project of the “Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-economic Vulnerability in the Arab Region (RICCAR)” through the Regional Knowledge Platform to assess the vulnerability of the water sector to climate change and to help formulate Adaptation plans.

On Management of Water Information and Decision Support Systems

20. Effective planning and management of water resources and making effective and sound decisions depends mainly on the availability of reliable water data and information for all major components of the water management system, including water sources, water users, water infrastructure, water quality, and system characteristics, spatially and temporally. Therefore there is an absolute necessity to establish a comprehensive national, or basin-wide, water management information system (MIS) to be used in the monitoring and modeling process and is linked to the decision-making and planning process.
21. To take advantage of the rapid developments in modern technologies in all aspects of hydroinformatics, such as data collection from on-site and remote sensors, cloud analytics and artificial intelligence, interactive dashboards and advanced access platforms, which are providing a new world of data and analytics open in the public domain. The GCC countries should take advantage of these developments to modernize all aspects of the water information data value chain - from data to information to knowledge - to generate insights to support decision making at all levels for planning and day-to-day operations.

The conference authorizes the Board of Directors of the Water Science and Technology Association (WSTA) to submit these recommendations to the Secretariat General of the Cooperation Council for the Arab States of the Gulf (GCC SG) for presentation at the Water Ministerial Committee meetings and to follow up on their implementation progress. The conference also requests WSTA to circulate these recommendations to relevant regional and national organizations and water-related forums, and to the Arab regional preparatory meeting for the comprehensive mid-term review of the International Decade of Action on Water for Sustainable Development (2018–2028).



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