(Proceedings of the 11th Kovacs Colloquium, Paris, France, June 2014). IAHS Publ. 366, 2015

Water security in the Gulf Cooperation Council (GCC) countries: challenges and opportunities

M. AL-RASHED & A. AKBER

Water Research Center, Kuwait Institute for Scientific Research, PO Box 24885, 13109, Safat, Kuwait
mrashed@kisr.edu.kw; aakbar@kisr.edu.kw

INTRODUCTION

The dwindling supply of natural water resources in the Gulf Cooperation Council (GCC) countries has sparked discussions amongst water experts and professionals regarding the viability and sustainability of the current water consumption patterns in the Gulf region and the threats posed to the wellbeing and prosperity that these countries have enjoyed throughout the past few decades.

STATUS OF WATER RESOURCES IN THE GCC COUNTRIES

In terms of natural water resources, the GCC countries are ranked among the poorest and least secure in the world. During the past 50 years, and as a result of the oil boom, these countries have relied almost entirely on seawater desalination (reliance on desalination to produce freshwater in the GCC countries ranges from 50−90%) to meet the freshwater needs of the various consumption sectors. However, such reliance on desalination comes at a very high price. The extremely high capital and operational costs of seawater desalination have weighed heavily on the financial resources of these countries at the expense of other developmental plans and strategies. For example in Kuwait, the government spends 1.3 billion KD (US$4.55 billion) annually to operate and maintain water desalination and energy production plants. According to a recent study conducted by the Kuwait Institute for Scientific Research (KISR), Kuwait currently uses about 12% of its oil production to provide the fuel needed to operate these plants. This percentage is expected to increase to about 50% by 2050 (El-Sayed *et al*. 2010). In addition to the high financial burden, these plants pose a serious environmental threat in terms of gaseous emissions into the atmosphere (for example, seawater desalination and power generation plants in Kuwait emit 230 metric tons of nitrogen, sulphur and carbon annually into the atmosphere; El-Sayed *et al.* 2010). Furthermore, these plants are vulnerable to unexpected shutdowns and/or periodic maintenance, particularly in cases of seawater pollution, environmental catastrophes and war. Therefore, the GCC countries should relentlessly explore all possible avenues to find additional sources of freshwater supplies to meet the increasing demand.

Despite its limited quantities and mostly poor quality, groundwater is an indispensable source of water for the GCC countries. It is used for blending with desalinated water to make it potable, as well as in numerous agricultural and some oil-related activities (with the need to enhance recovery and to produce heavy oil reserves, oil companies in the GCC countries are relying more and more on injecting either groundwater or steam produced from it into the oil-bearing aquifers to increase their pressure and/or the mobility of oil, thereby increasing the quantity of oil produced). The aforementioned activities have resulted in a significant drop in the groundwater levels and deterioration of its quality.

Treated wastewater is one of the emerging water resources in the GCC countries. Dependence on this source of water has increased significantly, particularly during the past few years. The produced water is used for agricultural and landscaping purposes as well as various non-potable activities. Despite the fact that this source of water is the only source that increases with the increase in population, its utilization has been constrained by the “impure” stigma attached to it.

In brief, the challenges facing the GCC countries with regard to the water resources can be summarized as follows:

- Absence of an optimal management and protection plan.
- Absence of financial resources to explore the prospects of non-conventional water resources (especially wastewater treatment and re-use).
- Absence of public awareness about the importance of the water resources and their role in the prosperity and wellbeing of the GCC countries.
- Absence of effective water-related policies and legislation to manage, utilize and protect the water resources.

If properly addressed, these challenges can be converted into invaluable opportunities through:

- Development of innovative and efficient new technologies to increase the production capacities of the seawater desalination plants with an emphasis on non-fossil fuels and renewable energy (solar and wind).
- Increasing the water tariff system (in Kuwait for example, consumers pay only 8% of the actual freshwater production cost at a rate of KD 0.8/1000 Imperial gallons (US$2.8/1000 Imperial gallons) while the actual production cost is KD 10/1000 Imperial gallons (US$35/1000 Imperial gallons) (Al-Rai Daily Newspaper 2013).
- Implementing the consumption slices scheme for fixing tariffs (to encourage consumers who exert effort in saving water and penalize those who do not abide by water saving instructions).
- Launching rigorous public awareness campaigns to instil a culture of water-saving in the society (KISR's experience has proven to be positive in this regard, where a reduction of about 50% in freshwater consumption was registered in households and government entities that used water-saving aerators provided by KISR).
- Exploring the prospects of utilizing innovative and emerging technologies to increase water production and ensure optimum utilization of the water produced.
- Exerting relentless efforts to sustainably manage and protect natural water resources with emphasis on anthropogenic activities (agricultural, industrial and oil-related activities).
- Developing and enforcing appropriate water-related policies and legislation.
- Encouraging implementation of artificial recharge of groundwater aquifers with excess water from desalination plants and treated wastewater, to enhance its quality and quantity, and create a strategic reserve of usable water that can be used during peak demand periods.
- Considering water harvesting of runoff water as a supplementary source of water.
- Educating the agricultural sector of the dire consequences of groundwater mining and encouraging its diversion to alternative sources of water (treated wastewater for example) as well as providing guidance on the use of efficient irrigation techniques to lessen the pressure on the groundwater system.

CONCLUDING REMARKS

It is important that the GCC countries learn from the lessons of countries that adopted comprehensive water security strategies early in the last century and are now reaping the benefits in terms of augmented water resources and well-rooted conservation schemes. Drafting a comprehensive strategy on water security in the GCC countries is an endeavour that is already overdue. This plan needs to be carefully revised and updated based on the new developments, challenges and opportunities on the ground. Unless this plan is developed, the GCC countries will continue to face enormous (and probably existential) challenges in the future.

REFERENCES

Al-Rai Daily Newspaper (2013) Issue No. A0-12536, Sunday, 27 October 2013.

El-Sayed, E., *et al.* (2010) *Assessment of Electrical Power Generation and Water Desalination Plants*, Vol. 1: *General Assessment*. Kuwait Institute for Scientific Research, Report No. KISR10404, Kuwait.