INTEGRATED SUSTAINABLE WATER RESOURCES MANAGEMENT

Shaikha Ahmad AlShaikh
MSc in Engineering Management
Supervised by: Dr Alaa A-Ameer
British University in Dubai
February 28, 2018

CONTENTS

- Why is looking into an Integrated Sustainable Water Resource Management Plan important for the UAE?
- Significance of the Study
- Challenges in the Water Resource Management in the UAE
- Findings & Recommendations

WHY SWRM?

Rapid Population Growth

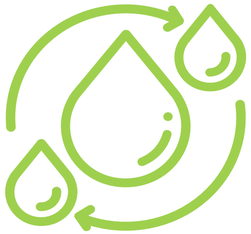
An increasing population, heightened standards of living and new emerging economic sectors have caused a strain on the country’s water supplies. The UAE is an expanding economy and the demand for water from different economic sectors threatens to surpass the supply of the little water available (International Trade Administration).

Reliance of Groundwater & Desalination

The UAE’s primary water sources are groundwater and desalinated seawater. The country relied on groundwater resources by pumping it from wells and other groundwater sources. Over the years, this extraction strategy has proved to be unsustainable because the groundwater reserves have been depleted in the last decades (Abu Dhabi Food Control Authority). At the same time, the quality of the water supplied has significantly declined within the period under assessment.

Climate Change

Climate Change has an influence on the availability of water resources. The management of water resources has a direct impact on mitigating the effects of climate change in many countries as well as promoting the sustainability of various social and economic activities. Heavy dependence on Desalination results in its emissions which contribute to global warming, which in turn adds to climate change, which worsens the environmental conditions in the UAE.



UAE Water Consumption Rates

The UAE has among the highest water consumption rates. FEWA affirm these statistics by saying that the average UAE resident consumes up to 550 liters of water per day (UAE Statistics Center). The Global Consumption of Water per person is pegged at between 170 liters – 300 liters (UAE Statistics Center). Researchers have pointed out that the demand for water in the UAE has steadily increased in the last ten years (Gonzalez et al. 415). The demand for potable water has also increased in a similar trend because in the year 2000, it was about 1,000 million liters per day, but in 2012, this figure had dramatically increased to 3,700 million liters per day (Nunes).

Significance of the Study

For a long time, the UAE has focused on improving the supply of water management rather than looking for new ways of reducing the demand. A core theme that is emerging in this study is the need for the UAE to focus more on water conservation as opposed to increasing its water production.

This study is significant to policymakers who are looking into this challenge of finding sustainable solutions to water scarcity. Stakeholders strive to provide the people with this vital resource with difficulty because they cannot seem to provide viable alternatives fast enough to keep up with the demand for water.

WATER RESOURCE MANAGEMENT

CHALLENGES IN THE UAE

National Awareness

Although the UAE has been a leader in launching sustainable development initiatives in the region, there is little evidence to show that the same goal is trickling down to how residents of the country use water.

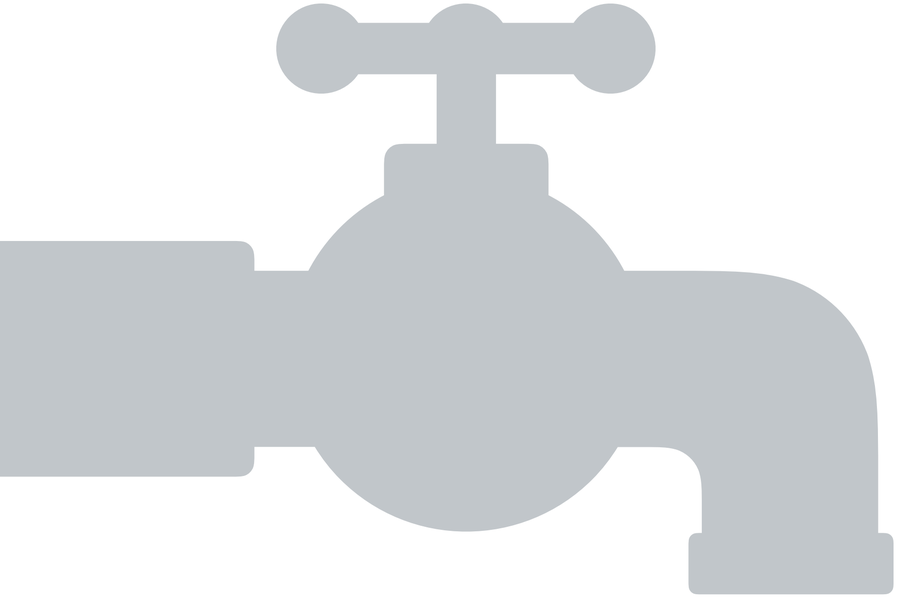
WRM Strategies

Current water management strategies in the UAE have been mainly focused on promoting a top-down management structure, where authorities and the government try to increase the nation’s capacity of water production without tackling the rising demand of water, which is equally a significant contributor to the problem.

Short Term vs Long Term

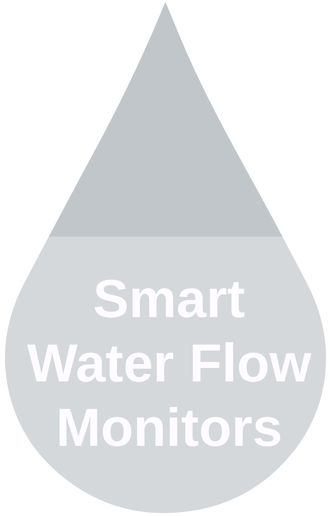
Many entities in the UAE are digging deeper wells to tap into groundwater resources, but they fail to realize that this strategy will soon max out their reserves. Similarly, other communities have chosen to pipe their water from distant surface water sources (Al Qaydi 155). These strategies could provide short-term relief, but they come at an incalculable cost to the environment.

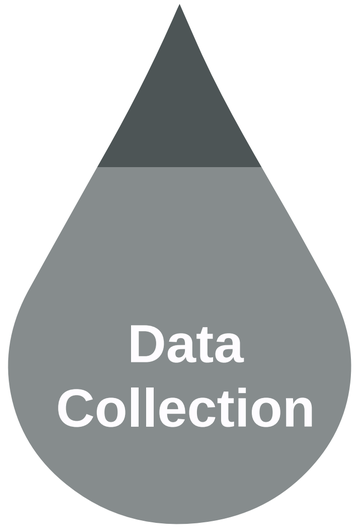
FINDINGS
SUGGESTIONS



Smart Water Systems

Smart water management strategies have been voiced as a viable solution for the management of water resources (International Water Resources Association). Using Smart water management systems will require the uses of information technology tools to manage water, and relying on the use of large quantities to data to support the same purpose.





Applying Green Building Standards in Building Codes

Green building attributes are solutions that should be adopted to improve the demand-side issue part of its water management efforts, since water conservation is a key component of its implementation.

Aerator Taps

Experts propose installing aerator taps to reduce the quantity of water used in Green buildings (Rodin Group Company). Studies show that aerators could lead to up to 87% savings in water use because they use isoflow technology, which minimizes water flow by providing a steady, but minimal, water flow for users (Verità; Rodin Group Company). This type of technology also prevents taps from dripping.

Harvesting of Stormwater

Although the UAE receives little rainfall in a year, it is possible to save the low quantity of water through water harvesting technology. Stormwater should be harvested from the rooftops of buildings and stored in a percolated reservoir. Doing so could help to reduce the quantity of potable water (Clemen). Besides installing pipes and rails for trapping rainwater, a requirement to install panels on the roofs to help in energy management is a necessity to rely green energy to power facilities that will be used in the buildings, like Solar Panels.

Coordinating Governing Water Management Policies

The UAE policy and legal framework governing water management appears to be segmented in the sense that different Emirates have specific aims that influence how they manage water in their region (Abu Dhabi Food Control Authority). These disparities are partly informed by variations in water supply and economic potential to extract water or improve its infrastructure (Government of Abu Dhabi). Understandably, population pressures and differences in economic activities also influence how such regions choose to manage their water resources. However, the problem created by such a system is the lack of coordination in water resource management.

Raising Awareness

Raising Awareness, educating and incentivizing the People of the UAE on the use of water.

- Consumption rates per person has to drop. This could be done by awareness campaigns and billing rates to incentivize.
- Adopt the “Time of Use” policy with water & energy.

References

- Abu Dhabi Food Control Authority. “Initiatives to Ensure Sustainability of Water Resources.” *ADFCA,* www.adfca.ae/English/MediaCenter/Publications/Documents/INITIATIVES%20TO%20ENSURE%20SUSTAINABILITY%20OF%20WATER%20RESOURCES.pdf. Accessed 14 Jan. 2018.

- Al Awar, Meshgan. “Management of Water Resources in the UAE.” *International Journal of Environment and Sustainability*, vol. 3, no. 4, 2015, pp. 1-10.

- Al Qaydi, Saif. “The Status and Prospects for Agriculture in the United Arab Emirates (UAE) and Their Potential to Contribute to Food Security.” *Journal of Basic and Applied Sciences,* vol. 12, no. 1, 2016, pp. 155-163.

- Arnbjerg-Nielsen, Karsten, et al. “Impacts of Climate Change On Rainfall Extremes and Urban Drainage Systems: A Review.” *Water Science and Technology*, vol. 68, no. 1, 2013, 16–28.

References (Continued)

- Clemen, Dave. “Green Building – Ecological Construction.” *Legrand,* www.legrand.com/EN/green-building-description_12850.html. Accessed 14 Jan. 2018.

Consultancy. “The Top 50 Most Sustainable Cities for Water Management.” *Consultancy*, www.consultancy.uk/news/12068/the-top-50-most-sustainable-cities-for-water-management. Accessed 14 Jan. 2018.

- Donat, Peterson. “Changes in Extreme Temperature and Precipitation in the Arab Region: Long-Term Trends and Variability Related to ENSO and NAO.” *International Journal of Climatology,* vol. 34, no. 3, 2013, pp. 581–592.

- Gonzalez, Rocio, et al. “Water Budget Analysis in Arid Regions, Application to The United Arab Emirates.” *Water*, vol. 8, no. 1, 2016, pp. 415-420.

References (Continued)

- International Water Resources Association. “Smart Water Management Project.” *IWRA,* www.iwra.org/swm/. Accessed 14 Jan. 2018.

- Nunes, Sharon. “Smart Systems for Planetary Water Management.” *SDM,* www.sdm.mit.edu/conf09/presentations/sharon_nunes.pdf. Accessed 14 Jan. 2018.

- Rodin Group Company. “Aerators - Constant Flow and Reduced Flow Water Saving.” *RGC*, www.therodingroup.co.uk/6/Aerators_-_reduced_flow_and_constant_flow_water_saving/#sthash.N63qxEnL.dpbs. Accessed 24 Jan. 2018.

- UAE Statistics Center. “Energy and Water Statistics.” *SCAD*, www.scad.ae/Release%20Documents/Energy%20and%20Water%20%20Cover%20-%20EN-v2.pdf. Accessed 14 Jan. 2018.

References (Continued)

- Verità. Monte. “Smart Systems for Water Management.” *IDSIA,* www2.idsia.ch/cms/smartwater/wp-content/uploads/sites/3/2016/08/SMART-SYSTEMS-FOR-WATER-MANAGEMENT.pdf. Accessed 14 Jan. 2018.