THE POLITICAL, ECONOMIC AND SOCIAL CONSEQUENCES OF GROUNDWATER DEPLETION IN THE ARAB REGION UNDER PREVAILING CHALLENGES AND CLIMATE CHANGE

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ABSTRACT This paper presents the importance of groundwater in the Arab Region due to its importance in drinking water supply. Since most of the Arab groundwater resources are being depleted beyond sustainable use e.g. Libya, Jordan, Saudia Arabia, Yemen, etc, future projections about their impact on politics and economics as well as social coherent, as we can see today in some countries, shows alarming signals about instability and economic growth. As the Arab countries are making the least planning and preparation to combat this coming crisis, especially countries with the lowest financial income and limited water resources, future water supply seems to be crucial in terms of future water and food security. Climate change impact in semi-arid areas will hit first groundwater recharge as reduction of rainfall will impact venerable groundwater recharge rates.

Notation

Groundwater depletion, political unrest, unsustainable, water scarcity, Arab region.

1. Introduction

The Arab region is one of the world's poorest regions in terms of water availability and has been also described as the most likely to suffer from this crisis on a global level. Yet the Arab world is making the least planning and preparation to combat this coming crisis, especially countries with the lowest financial income and limited water resources. The situation is further exacerbated by the political turmoil and civil wars that prevail in some countries of the region. Which in turn fuels political unrest, demonstrations and protests at the national level due to lack of water, or at the regional level due to tensions resulting from shared water basins across the Middle East e.g. the Tigris and Euphrates basin (Turkey, Syria, Iraq and Iran), and the Nile River basin between Egypt and the rest of the riparian's countries of the blue and white River basins of the Nile, as well as the Jordan River basin (Israel, Lebanon, Syria, Jordan and Palestine).

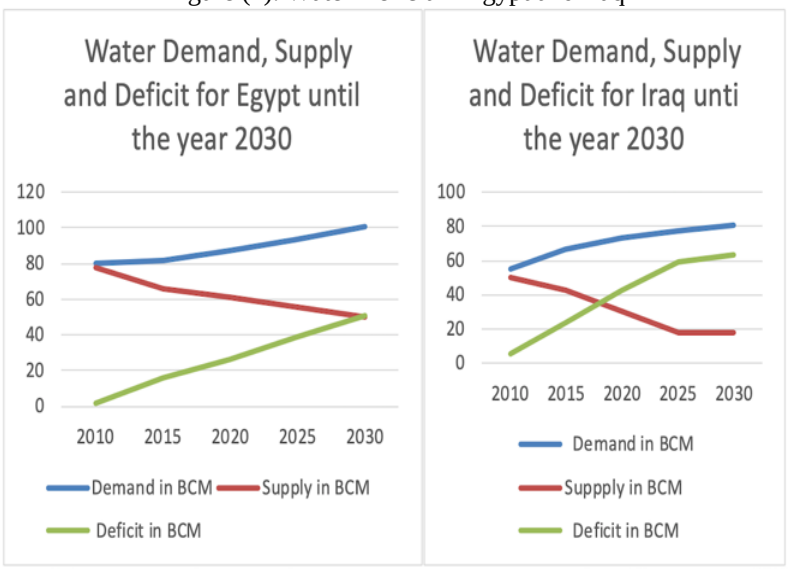
As more than 60 % of the Arab water resources are flowing in from outside their political borders, the issue of transboundary and overpumping of precious groundwater resources became a very serious challenge as it combines with climate change, poor water governance with all possible impact on economic development due to lack of water and the need for additional financing to substitute lost resources through expansion and upgrading of existing infrastructure. Such financing under prevailing conditions, most probably is difficult to allocate, secure and utilize.

2. The Magnitude of Water Shortages Problem

The plotted data below of Figure 1 indicate the magnitude of the problem of water shortages in Iraq and Egypt over the next ten years because of the actions of the countries of the Upper Riparian's countries and their impact on the continuity of supply and the resulting deficit over the coming years. Consequently, this will result in significant political and economic consequences on Iraq and Egypt unless appropriate measures are taken to protect the water rights of these two countries. The water expert, Dr. Mahmoud Abu Zeid, has explained during the water symposium "The Future of Water in Egypt", held at Ain Shams University in March of this year, that Egypt's share of water has decreased by 7.5 billion cubic meters due to the construction of the Ethiopian Renaissance Dam, which is consistent with the plotted data below of Figure 1. As for Iraq, the water situation has become more influential on public life in terms of lack of water supply, and the events that took place in the city of Basra last summer is a good proof of that. This shortfall in both Iraq and Egypt will be partly offset by pumping from underground water with its high financial and environmental costs, as well as the tendency to desalinate water and the need to invest in raising the efficiency of irrigation systems to reduce water losses.

Since the early 1980s with the introduction of deep drilling technologies for under groundwater wells, with lack of deep knowledge about the dynamics, recharge and sustainability of groundwater resources, many Arab countries drilled extensively to develop agricultural projects that have no economic feasibility, considering the water economics and the water value which ended up in depleting important strategic resources that government struggled later to close them or even regulate them as show by figure 2.

Figure (1): Water Deficit in Egypt and Iraq



Source: Author of the article after updating and recalculating numbers from different sources (2019).

MENA countries in general, and the Arab Region in particular, witnessed over the last 3-4 decades, major developments to its economies and social systems. However, further progress, especially for non-Petro countries, hindered by population growth, influx of refugees, political instability and water scarcity. Water shortages exuberated further by mal practices, as it is the case, in overusing the precious under groundwater resources and transboundary violations through unilateral actions by upstream riparian countries, as it is the case between Turkey and Iran with Syria and Iraq.
There is no other region in the world as in the Arab region where water is so important for economic growth, development, security and environmental systems as most economic activities are highly dependent on water scarcity. For most of the countries facing economic, social and health challenges, COVID-19 and transboundary issues added more burden to its fragile infrastructure and weak financial situation (e.g. Iraq, Egypt, Lebanon and Jordan). This means, however, that countries are paying less attention to sustainable development which makes some courtiers are lagging in achieving SDGs.

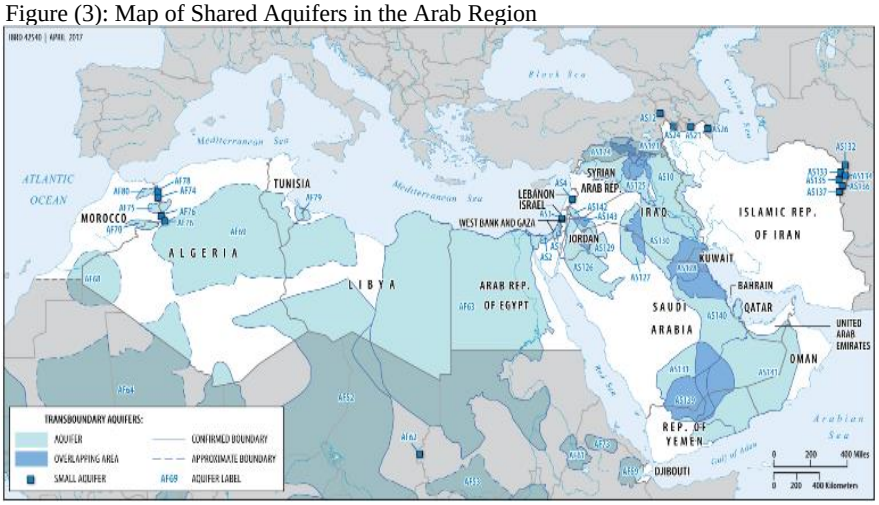
Figure (2): Large-scale water drilling projects

3. Groundwater Resources of the Arab Region

Groundwater in the Arab region is the main supplier of domestic and drinking water, especially in Bahrain, Jordan, Saudi Arabia, Lebanon, Oman, Tunisia, UAE, Yemen and Palestine, contributing to about 50% of the total water supply with up to around 80% of the water supply contribution in the Arabian Peninsula. Figure 3 shows the extent of shared groundwater aquifers among most of the Middle Eastern countries.

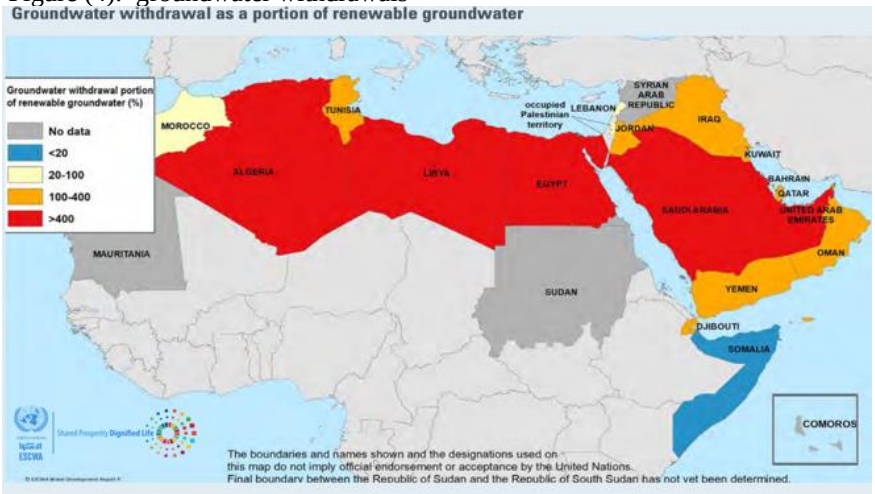
Despite of groundwater resources to the stability of the Arab Regions, most of the Arab countries are over pumping its resources with high percentages to the total renewable available groundwater resources, as shown in below in figure 4.

Figure (3): Map of Shared Aquifers in the Arab Region



Herby lies the importance of groundwater and the need to preserve it as an internal strategic resource and the importance of keeping it protected from the regional political turmoil and tensions. However, instead of focusing on this strategic resource, attention is being diverted towards the common surface water basins (rivers) between these countries out of fear of outbreak of tensions, conflicts and wars over them. The challenge of Groundwater wells and their depletion has been forgotten at the local level. Even often groundwater wells were used as awards of satisfaction to the implementers under the pretext of investment or were granted to some groups under different political causes, such as appeasing some groups and entities to establish unsustainable investments which will become a curse for their owners later when this water depletes or becomes salinized.

Figure (4): groundwater withdrawals



Source:All data from FAO, AQUASTAT database except for: Kuwait from 2021.إدارة الإحصاء ومركز المعلومات; Bahrain and Qatar for years 2000 and 2010 from Al-Zubari and others, 2017; for Saudi Arabia 2016 data from 2018 .وزارة البيئة والمياه والزراعة; and for the United Arab Emirates 2017 data from Al-Mulla, Ministry of Energy and Infrastructure, 2021.

4. Political and Economic Consequences

All of which will pose further consequences and significant political problems when these groups are unable to meet their water investment needs and are forced to leave them on short notice, unless measures are taken to reduce pumping to sustain continuity of groundwater aquifers. However, measures to eliminate over pumping such as reduction of abstraction rates and imposing of water surcharges (pricing) on groundwater wells are usually politically unpopular, and in most cases difficult to implement.
According to many recent regional and international studies as well as the political turmoil being witnessed in many of the Arab world cities most likely 17 or maybe less out of the 22 Arab countries will be subject to political unrest and threats of security as a result of water scarcity exacerbated by groundwater depletion. This is not only due to wars, revolutions, terrorism and poverty, but also due to water reasons, which will play a role in changing the political reality as water availability is directly linked to poverty and unemployment. This is also expected to slow down economic growth because of the lack of water available to establish new economic projects that increase growth and create jobs, or that provide and supply food at reasonable prices.
To illustrate this point and to link the reasons mentioned above with the topic of the article, we need to look at the increase in commodity prices, especially food production and, in particular, the production of cereals using irrigated agriculture based on groundwater, which was for example one of the reason that fueled instability during what so called “the Arab Spring”. In the coming years some countries in the Arab region will witness more unrest and sit-ins because of the impact of water on food supplies and grain production and their impact on prices of bread, drinking water and sanitation services. Of course, the crises will be exacerbated more as the rates of groundwater depletion and salinization increase over the coming years.

Unfortunately, most Arab governments do not want to know more about the problems of groundwater depletion because groundwater is invisible to the naked eye. Groundwater is also an extremely complicated technical matter which is difficult to understand by most politicians, meanwhile governments avoid (except for a few) tackling groundwater related issues as they have enough internal political problems, especially since the impact of groundwater depletion would appear on the long-term and will not be during the term and mandate of this government or that.

According to the World Bank’s (2017) report, 71% of the GDP in the Arab region is linked to or threatened by water scarcity. Furthermore, according to the report, Arab economies are losing 4-14% of their GDPs due to climate change associated with water shortage, mostly those related to excessive pumping from groundwater. Which means that the region is in need of further financial investment to build new infrastructure for desalination and wastewater treatment projects to compensate for the shortfall estimated at 170 billion cubic meters by 2020, a number which will steadily increase in the years to come (El-Naser, 2009).

These financial requirements may not be fully or even partially available in most non-oil Arab countries. The latest World Bank report, issued in March of this year (2019), "Integrating Green and Gray Infrastructure” stated that by 2050 twenty percent of the world's population will live in areas threatened by floods, where around 5.7 billion people will live in areas suffering from water scarcity. Undoubtedly, Arab countries are at the forefront of these countries. According to the report, by 2030, the world will need $ 6.7 trillion to meet water needs due to population growth and economic growth. The share of Arab countries is estimated to be around $ 500-600 billion over the next ten years, which means that about 4.5% or more of their GDP should be spent on water projects. In the absence of such funds, there will be more humanitarian suffering because of the inability to provide water together with other political and social problems like poverty, unemployment, and diseases, among others. Of course, the poor and the neediest, Women and children will be the first to suffer.

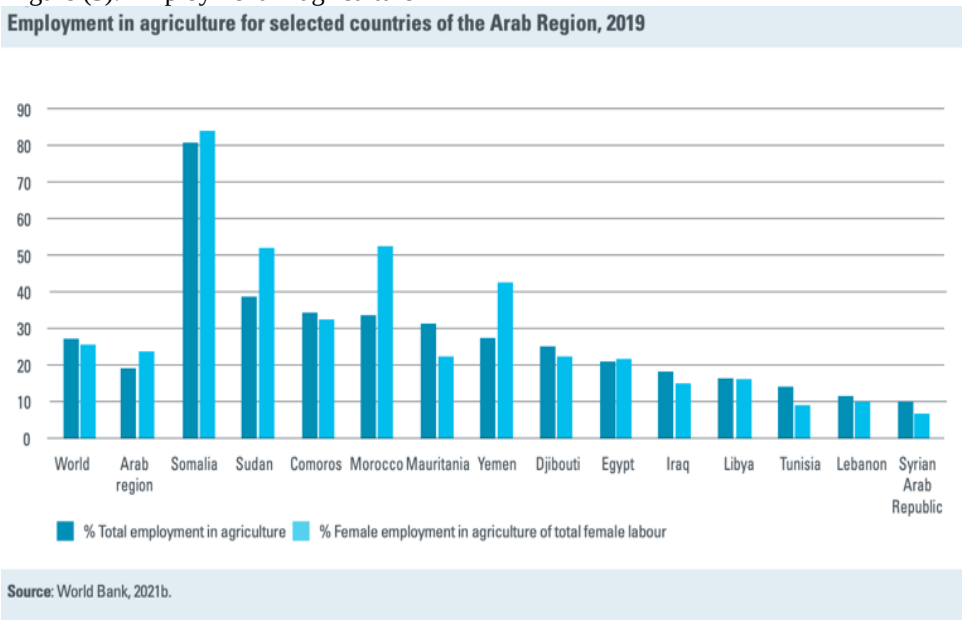
According to UN studies, three out of four jobs in the world are directly or indirectly dependent on water resources availability. This means that a large and significant part of the possibility of creating new jobs depends directly on water availability and their sustainability to cater for such projects, for which Jordan can be a good example. Moreover, the problems of water scarcity and access to water for various purposes, as well as those related to the provision of sanitation services, will limit economic growth and job creation in the coming years as mentioned in the UN report. The UN report on the world's water resources development in 2016, entitled ‘Water Resources and Employment’, implies that half of the world's laborers of 1.5 billion people work in eight industrial enterprises that are most dependent on water resources. Indeed, some countries have launched the slogan ‘Job Per Every Drop of Water’ due to the of the importance of the subject.

5. Social Impact

Continuing the current practices of groundwater overdraft for irrigated agriculture, raises significant concern about the sustainability of the precious groundwater resources and agricultural activities relies on such resources. Such investments on groundwater with depletion schemes can cause failure to existing investment and related food security and thereby, threatening the daily diet of workers and farmers, as well as losing jobs and environmental and ecological systems connected to groundwater. Long-term depletion of groundwater resources will impact sustainability of drinking water supplies in basins sharing water uses between irrigated agriculture and domestic water demands. Loosing such important and strategic resources will increase poverty and job creation. Figure 5 shows percentage of people working on the agriculture sector in the Arab Region.

The most important threat facing small farmers depending on groundwater wells, is the sustainability of the resources and their ability to continue producing the needed amounts of water in arid areas. Lack of long-term vision towards groundwater sustainability will throw venerable farmers out of business with all associated social impacts including but not limited to job loss, migration, public health and family issues.

Figure (5): Employment in agriculture

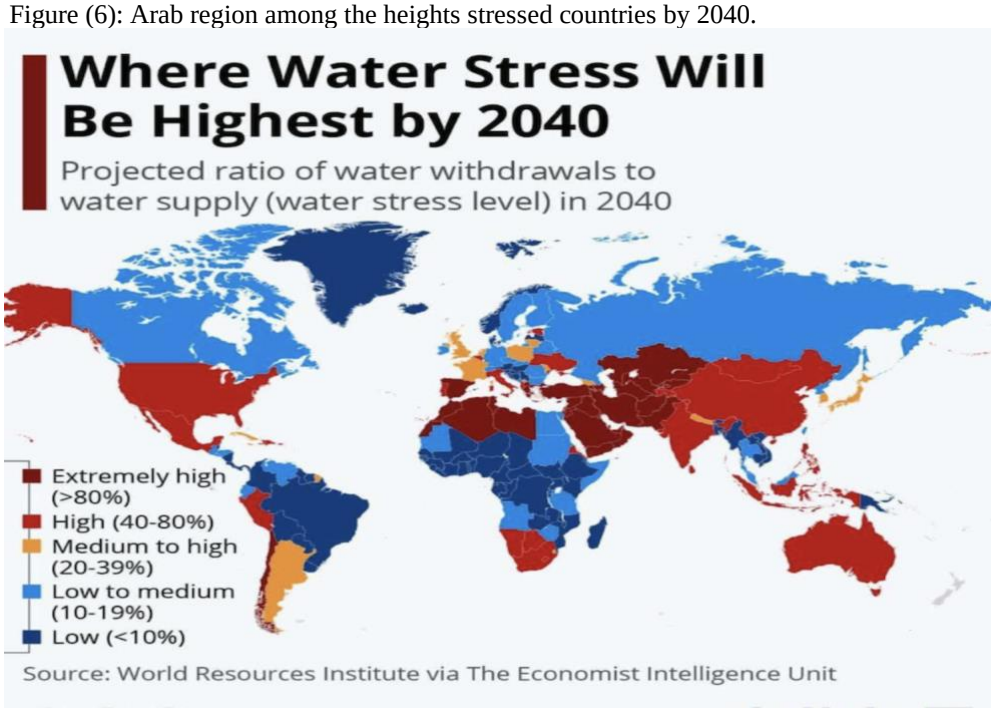


6. Impact on Climate change

As groundwater aquifers relatively protected from short -term impacts such as seasonal rainfall variations, draughts and pollution, it considers as important adaptation element. Therefore, countries depend on groundwater in crisis management and draught use and overuse groundwater as an available resource for immediate demand. As part of mitigation and adaptation measures optimizations, the Arab Region is requested to assess and enhance conjunctive use between surface water, groundwater and wastewater reuse. Impact of rainfall reduction cause by climate change on groundwater sustainability needs to be studied and evaluated to set the right adaptation programs to deal with the long-term economic, social and environmental consequences.

Due to the collective challenges mentioned above including recent projections that show (Figure 6) the Arab Region as one of the highest stressed countries by 2040 as 19 out of 22 Arab countries ration of water withdrawals vs renewable resources will be more than 80%, will fuel more impact to climate change and any envisaged plans for resilience.

Figure (6): Arab region among the heights stressed countries by 2040.



7. Recommendations and Conclusions

The institutions working in the water facilities from civil society organizations (NGOs) are required to work on raising public water awareness among citizens and in particular the importance of groundwater for future generations and the intergeneration equity. It is also vital to open a dialogue with governments to take the necessary reforms and actions required to maintain these scarce and precious water resources. Simply because without these there will be more suffering, financial difficulties, increased indebtedness and political pressure from the upper riparian's countries.

As for the Ministries and regulatory bodies working in the water sectors, they are required, under their responsibility towards future generations, to develop general strategies for water conservation and to formulate the policies necessary to conserve groundwater from depletion and salinization. They should also enact the necessary laws, and regulations, along with their required work plans and procedures to protect this water resource from illegal drilling, or desalinization due to over-pumping. It is also crucial that the various components of the state adopt these policies and work in an integrated manner with teamwork to achieve the envisaged goals and objectives. Otherwise, the unemployment rate will rise because of the lack of water projects which generate employment opportunities. Economic growth rates will also be at risk due to lack of water which will increase the political unrest that threatens the security and stability of many Arab countries because of high prices of commodities dependent on groundwater, such as grain and bread. All of which can be avoided once there is serious political well and popular desire to make real reforms to the water sectors in our Arab region. More specifically, regarding the preservation of groundwater from depletion and salinity without fear of class or appeasement of others, as the future of millions of future generations and the stability of Arab countries is much more important than the financial interests of a limited group or opportunists.

There is an urgent need for the Arab countries to initiate long-term studies on the impact of climate change on groundwater sustainability and the needed programs and measures for adaptation and mitigation.

In conclusion, this natural precious wealth belongs to all citizens and must be distributed justly among all people according to the minimum requirements of democracy and basic rights of citizens and humanity.

Back to the title of this paper "**groundwater depletion",** the said challenges need collective actions, and this is the time for addressing the water scarcity in the region through water security framework that takes into consideration many important pillars, SDGs, environment, human health, socio-economic development, innovation, introduction of new technologies, and regional cooperation. The frame shall further link energy and food production, all hand in hand with serious sector reforms by the countries under consideration and provision of finance by donors to increase water efficiency use and promote sustainability practices.

8. References

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