The use of treated wastewater as a solution to address the impacts of climate change in Lebanon and MENA region

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Summary: Access to adequate supplies of water is fundamental for a sustainable future in all countries, especially as climate change is expected to exacerbate water scarcity problems in many countries in the Middle East and North Africa. The agricultural sector consumes about 70% of the total water supply around the world. The recycling and use of treated wastewater in irrigation thus presents itself as a very important measure to adapt to climate change, and brings the opportunity to make more of the naturally available water resources available to meet the increasing demand in the domestic sector.

***Keywords**: Impacts of climate change, droughts, water scarcity, wastewater reuse, irrigation, non-conventional water sources, climate change adaptation, MENA Region.*

The challenges brought the effects of climate change

Climate change affects our planet and leads to a wide range of pressing challenges. Climate scientists inform that the impacts of climate change will, in the near future, become even more severe and widespread than any previous estimates. The effects of climate change are evident in the form of frequent heat waves and droughts, yet also more severe floods and storms.

Many climate change related publications inform that the Middle East and North Africa region is expected to be the most severely affected by climate change and global warming. Indeed, the region is predicted to be among the first regions in the world where fresh water will be depleted. It is also widely documented that most of the low-income countries around the world which depend on rain as a source of irrigation, suffer from poor management and a shortage of water resources [1]. While most countries in the Middle East are poor in water, this is further exacerbated by the fact that the legal frameworks and the strategy surrounding water management and planning are almost absent.

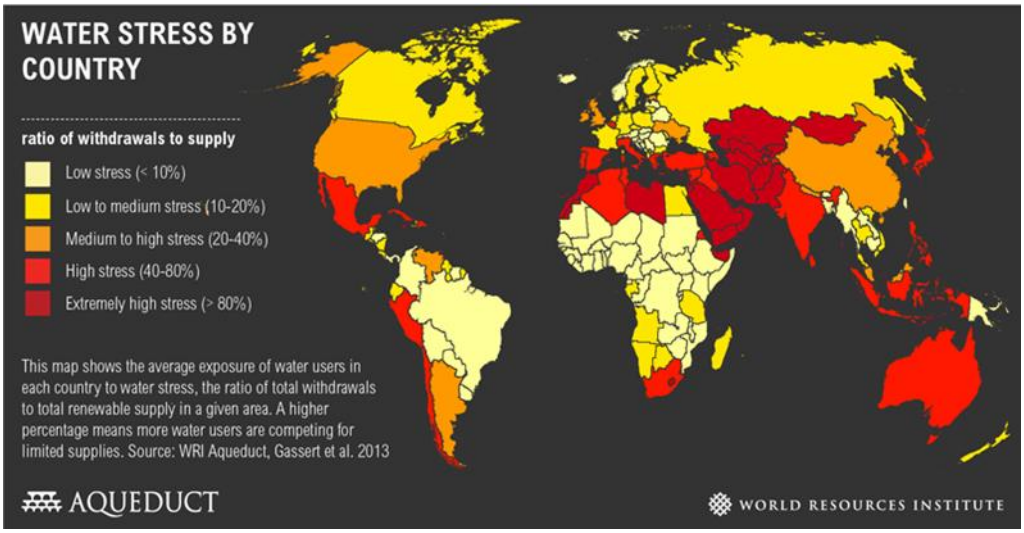

Fig. 1: Water stress by country. Source: World Resources Institute, WRI Aqueduct, Gassert et al. 2013

Currently, most of the Middle East countries face, at least, five months of extreme heat each year above previously recorded seasonal levels and also for longer periods of time than before, which leads to severe pressures on the already scarce water resources [2]. The continuous rise in temperature over prolonged periods have not only led to severe drought episodes but also been the cause of a large number of fires in multiple regions in the Middle East. Examples include the recent (2019 and 2020) large scale fire outbreaks in Lebanon, Syria, Palestine and Jordan.

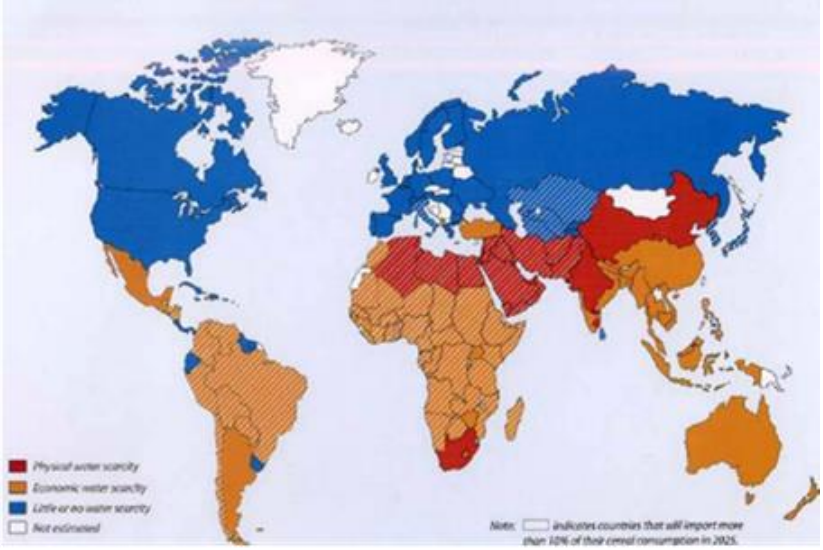

Fig. 2: Water Scarcity by country in 2025, www.waternunc.com

The impact of more frequent and more prolonged droughts began to strongly affect agricultural crop production and threaten food security [3]. In addition, the effects of drought have led to an increase in the demand for groundwater beyond the capacity of the available freshwater resources. (depletion of resources)

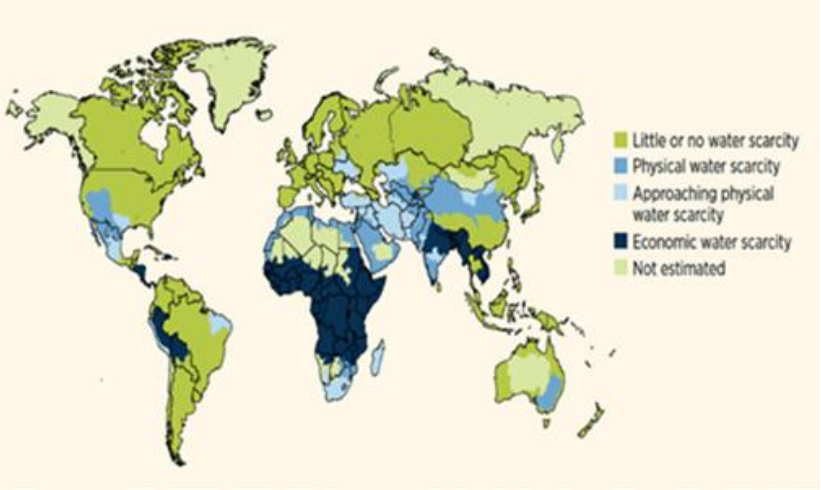

Fig. 3: Global physical and economic water scarcity
Source: World Water Development Report 4
World Water Assessment Programme (WWAP), March 2012

Business as usual is not an option in Lebanon

Possibly one of the most important challenges facing the region concerns the sustainable and efficient use of water resources. Clearly the aforementioned impacts call for urgent changes to be introduced to achieve sustainable water management.

In Lebanon, a large percentage of rural population faces acute and chronic water shortages. To address the difficulties to obtain water for their agricultural activities on a daily basis, the drilling of illegal artesian wells has become the norm. This scenario often repeats itself in low-income areas which depend on agriculture, such as the Akkar region [4].

As other countries in the Middle East and North Africa, Lebanon is also faced with an ever increasing domestic demand for water and a dwindling agricultural crop production. Very little, if any, attention is given to the recycling and reuse of treated wastewater for irrigation purposes.

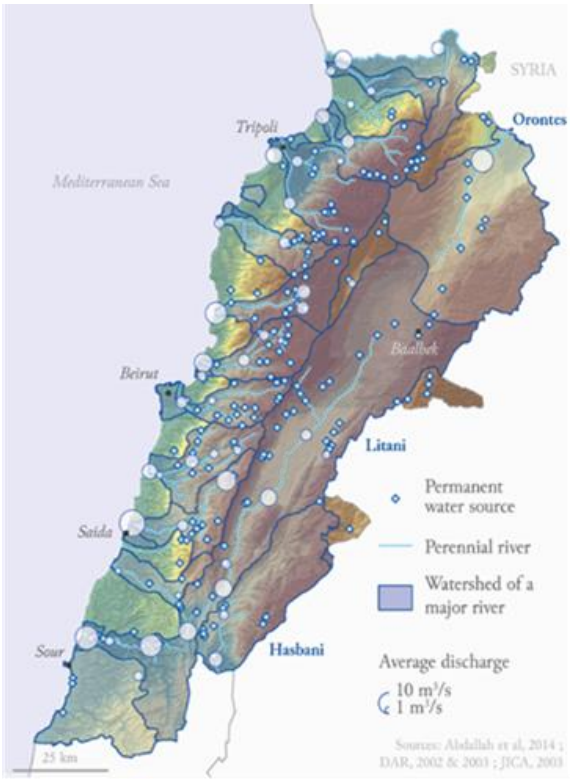

Fig. 4: The distribution of water resources in Lebanon (Publications de l'Institut français du Proche-Orient)

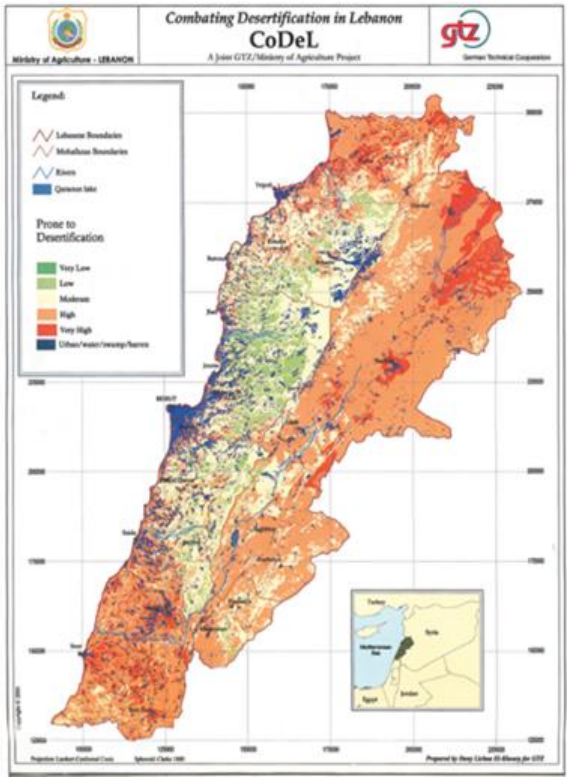

Fig. 5: 60% of the Lebanese territory is under threat of land degradation, mainly in Akkar/North Lebanon, Bekaa Valley, South Lebanon (https://thesouthernhub.org/)

The way forward

Therefore, the priority in the countries of the Middle East and in Lebanon in particular is to adapt to changing climatic conditions and to take quick and efficient measures that will help to build resilience to the impacts of climate change impacts. In particular, such measures should concern the use of non-conventional water resources to augment the naturally available resources such as groundwater which is fast becoming depleted. All the relevant public authorities in Lebanon should urgently come together to set the appropriate standards and guidelines for the safe reuse of treated wastewater.

The upcoming activities in the **AQUACYCLE project** are set to bring an important contribution to this debate in a variety of ways. A clearly crucial ambition of the project is to demonstrate the effectiveness of an eco-innovative wastewater treatment system that is specifically suited to the means and needs of low-income communities in rural areas. The treatment process is designed to guarantee a safe, plentiful and all-year-round supply of water for irrigation purposes in the agricultural sector, and hence to bring a solution to achieving sustainable development while protecting the environment.

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