Research Paper Political Science

Politics And Sustainable Use of Libyan Water Resources

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ABSTRACT *Water is essential for life. Libya is among the countries suffering from the water shortages. The Great Man Made River Project enabled transfer of water from the Nubian Sandstone Aquifer System (NSAS), an important water resource for Libya, to the northern part of the Libya. Libya should try to diversify its water resources through desalination of water as NSAS's water is non renewable and as one day water of the aquifer will exhaust. For this reason, as Libya has long coastline, desalination of water through wave energy has the potential for contribution to the solution of the water scarcity problem in Libya and to sustain the peace among the Nubian countries.*

KEYWORDS : politics, sustainability, water resources, renewable, non-renewable, aquifer.

Water is essential for life. Scarcity of water resources, however, tends to be intensified due to unsustainable consumption, extinction in underground water reserves as well as due to the increased demand for water as a result of the population increase in the World (Al Jazeera America, March 20, 2015). For this reason, sustainable use of water resources and relevant technologies have the potential for contributing to the peace as *"water security is one of the major challenges that we and future generations are going to have to contend with"* (FDFA, 2015).

Libya is among the countries suffering from the water shortages. Libya has 1.76 million km^2 of surface area (FAO, 2005) and it has five climatic zones (World Weather and Climate Information, 2016). Libya has water scarcity due to the fact that 5% of the country gets approximately 100 millimetres of rainfall per year (Russeau, 2011) and that less than 2% of the country gets rain sufficient for agriculture (World Weather and Climate Information, 2016). Water problem in Libya is not only due to the insufficient rainfall but also due to the salty lakes as 20 lakes are salty (Country Studies US, 2015). Libya has approximately 3,820 million m^3/year of water resources (Aqeil et al., 2012:1). Libya, however, faces water shortage of approximately 500 million m^3 /year as stated by Saad al-Din al-Gharyani, the groundwater expert (TheNewArab., 2015). Furthermore, rapid increase in the population, heterogeneous allocation of the population as well as water leakages put pressure on the water resources. With a rapid population growth rate, Libya's population has reached to 6 695 564 (Countrymeters, 2016). "*… 75% of the population is concentrated over 1.5% of the total area of the country*" (FAO, 2005). Although Libya is facing difficulties in supplying water to cities, there is still inefficiency in water usage as leakage and unaccounted for water losses are expected to be at 35-50% in old networks of Tripoli and other major cities (MEWINA Libya, 2013; CEDARE, 2014:20).

The water scarcity problem affected Libya's agriculture and economy adversely (Country Studies US, 2015). Agriculture sector consumes approximately 85% of water, whereas domestic consumption is at the 11.5% level and industrial consumption is at 3.5% level (Aqeil et al., 2012:1). Irrigation potential can reach to the 750 000 ha level with the use of fossil water and 40000ha can be irrigated in the coastal areas with the help of renewable water resources (FAO, 2005). Due to the water shortage in Libya, the country cannot use its potential to produce agricultural products which affects the income level of the country adversely. Mr. Aboud, the head of the information department at the Tripoli-based Libyan Ministry of Water Resources emphasised that Libya is expecting to be exposed to more water shortages as the groundwater recharge is approximately 250 million m^3/year, whereas consumption is at one billion m^3/year level (TheNewArab, 2015). Being one of the largest aquifer systems in the world, the NSAS (Nubian Sandstone Aquifer System) is important for Libya as it *"consists of a number of connected aquifers extending over more than 2 million km^2 under Libya, Egypt, Chad and Sudan and as it contains approximately 150,000 cubic kilometres of economically exploitable groundwater (Yamada, 2004)"* (Davids, 2005:4).

ibya tried to increase the efficiency in its water resources and Libyan economists suggested, as the cheapest solution to the water problem, construction of a pipelines network to transport water from the desert to the coastal cities, where majority of the population live (Watkins, 2006). With the aims of solving water problem, providing fresh water for the citizens, and making Libya self-sufficient in food production, Libya decided to make GMMR (Great Man-Made River) Project which consists of a network of underground pipes for transferring fresh water from underground aquifers in the Sahara to the Libyan cities (Amusing Planet, 2015). This project supplies water to the majority of the society. As Prof. Ivan Ivekovic stated *"the GMMR provides 70% of the population with water for drinking and irrigation, pumping it from Libya's vast underground aquifers like the NSAS in the south to populated coastal areas 4,000 kilometres to the north"* (Russeau, 2011). The feasibility of this project can be criticised as the water resources in NSAS are non-renewable and as their extraction and transportation are becoming uneconomical (Davids, 2005). Through this project, 6.5 million m^3 of water is transferred by 5,000 km of pipeline (supplied by over 1000 wells in desert) per day (Watkins, 2006). Furthermore, the ratio of the transportation costs of goods (for a distance of 100 km) to their total costs depends on the industries as this ratio is 5% for electricity, 2,5% for natural gas industry whereas it is 50% in water (Gordon-Walker and Marr, 2002; Gökdemir, 2008:13).

NSAS is important not only for Libya but also for Egypt, Sudan and Chad as all these countries deal with the scarcity of water. In the Nubian countries agriculture can only be done only in oasis areas depending on the availability of the groundwater and agriculture in Chad depends on the availability of drilled wells (IAEA and UNDP, 2013). For this reason, *"…access to the NSAS is a matter of national security, especially for Egypt and Libya, decisions concerning groundwater development projects are politically highly sensitive."* (Alker, 2008:267). Egypt, Libya, Chad, and Sudan have reached to a Joint Authority agreement serving as a joint institution/commission for the management of the shared aquifer and setting the basic rules for its functioning (International Water Law Project, 2016). The importance of this Joint Authority agreement is that it is among the few agreements worldwide over a transboundary aquifer (International Water Law Project, 2016). Despite of this peaceful agreement, scarce water resources, however, can cause conflicts among these countries in the future as NSAS water supply capacity is expected to be reduced due to its non renewable nature. Degree of scarcity of water is among the most important factors causing conflict over shared waters (Gleick, 1993; Schmeier, 2010).

Libya should give importance to improve its water resources otherwise (as NSAS non renewable) the next generations will face great problems. Libya has important access to sea and should benefit from this. As Libya has 1,099 miles (1,770 km) of coastline (Worldatlas.com, 2016), the country can produce energy form waves and desalinate water through this energy. Wave energy is perceived to provide more advantages compared to other renewables (e.g. wind and solar energy) especially due to being less variable and more predictable (Carne-

gie Wave Energy Limited, 2015). Desalination of water through wave energy has been successfully achieved in Australia's biggest naval base the Garden Island (Parkinson, 2015). Libya can benchmark from Australia with respect to the desalination of water.

In conclusion, as NSAS is an important water resource for Libya, with the help of the Great Man Made River Project, water could be provided to the northern part of the Libya. Libya should try to diversify its water resources through desalination of water as NSAS's water is non renewable and as one day water of the aquifer will exhaust. For this reason, as Libya has long coastline, desalination of water through wave energy has the potential for contribution to solution of the water scarcity problem in Libya and to sustain the peace among the Nubian countries.

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