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Policy brief: Middle East and North Africa: A Case for Regional Cooperation Water–Energy–Food Security Nexus

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Summary:

Water, energy and food resources in the Middle East and North Africa (MENA) region are in a critical situation in general but with inter regional variations. Additional stressors are projected to aggravate the water, energy and food insecurities, most prominently climate change impacts, population trends, and conflict and refugees. Given that these resources are closely interlinked and interdependent on each other, it is imperative that countries of the region enhance their cooperation to deal with these challenges in a nexus approach. The regional landscape presents opportunities for enhancing the cooperation on the WEF security nexus. The existing institutional landscape; the resulting policy on the regional level; the wide inter-variability in richness and scarcity ; and the increased level of awareness among policy makers on the importance of WEF security are areas to be exploited for cooperation on the WEF security in a nexus approach. Some tools might be needed to drive the process such as an improved knowledge base, technology transfer and innovation, mobilizing finance, information sharing, capacity and institutional building, encouraging private sector participation and a paradigm shift in donor funding and support.

Stresses on water security, energy security and food security in the Middle East and North Africa Region (MENA)

Water, energy and food resources

The Middle East North Africa (MENA) region is one of many contradictions and extremes in terms of its natural resources, socio-economic contexts, level of development and per capita income. The region, which is mostly rich in conventional energy resources such as oil and gas, is one of the most water scarce and food imports dependent regions in the world. The richness and scarcity are not pervasive but come with inter-regional variations. While most of the Gulf Cooperation Council countries fall below the 100 m³/capita/year of total renewable water resources, other countries such as Lebanon, Syria and Egypt are closer to the 1000 m³/capita/year water scarcity threshold level. Iraq on the other hand fares much better than the rest of the region with 2467 m³/capita/year, although most of this water does not originate from Iraq itself.¹ With nearly 80% of its fresh water coming from regions outside its boundaries, the whole region, tends to be highly dependent on transboundary water which plays a significant role in national water security and raises the potential for conflict.

Close to 60% of the main agricultural products that form the basis of the Arab population diet originate from outside the region.² The region is not only the largest importer of food in the world but also the largest importer of cereals. This dependency makes the region's countries vulnerable to market prices and fluctuations in production yields in other regions. Water and land availability as well as low yields are significant constraints to agricultural productivity in Arab countries.³

The region is well known for being rich in fuel and natural gas; however major inter-regional discrepancies exist. The majority of countries outside the Arabian Peninsula are actually net importers of oil. Figure 1 shows a sample of this spectrum.

Existing insecurities in water, energy, and food in the region have been linked to some of the conflicts in the region acting as a threat multiplier as well as pressure points⁴⁵. These insecurities are expected to be further intensified with the projected impacts of climate change, increase in population growth, economic growth, increase in urbanization rate and the ongoing security conflicts in the region.

¹ Food and Agriculture Organization of the United Nations (FAO), AQUASTAT Main Database, 2016, <http://www.fao.org/nr/water/aquastat/main/index.stm> (accessed November 2016).

² Khouri, N., 2012. 'Setting priorities for food security in the Arab world: Early results of an international collaboration', Paper presented at the joint IFPRI -ESC WA Conference Food Secure, Arab World, A roadmap for policy and research, Beirut, 6-7 February.

³ FAO, World Bank and IFPRI, *Improving food security in the Arab countries*, 2009, January.

⁴ Farajalla, N.S. 2009. "Water Resources and Conflict in Lebanon" in *Losing Paradise: The Water Crisis in the Mediterranean* (Holst-Warhaft and Steenhus eds.) Ashgate Publishing Ltd., Surrey, UK. ISBN 978-0-7546-7573-0

⁵ Darwish, M.R., Farajalla, N.S., and R. Masri, 2008. "Inter-temporal Economic Impact of the July 2006 War on Lebanon's Agricultural Sector." *Disasters - The Journal of Disasters Studies, Policy and Management*. Blackwell Publishing.

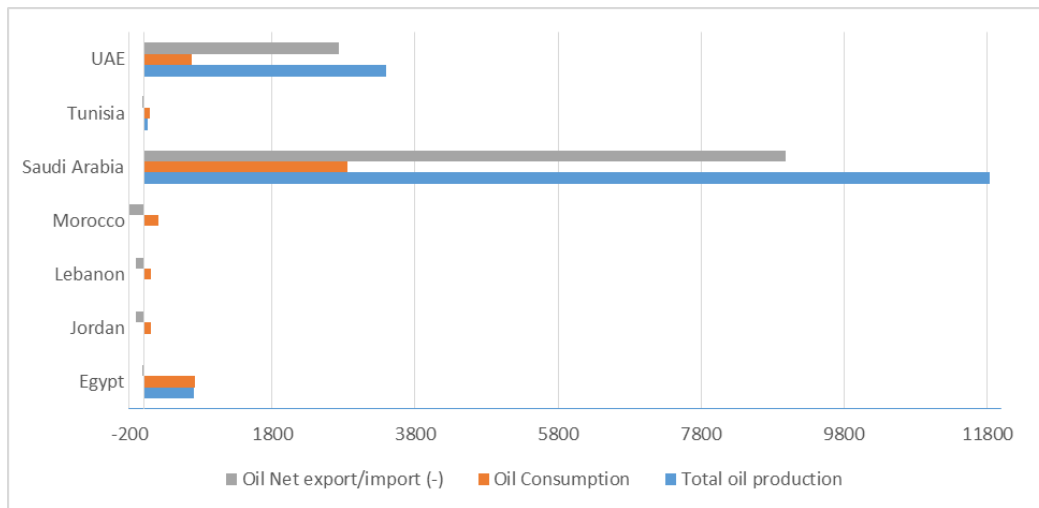


Figure 1 Oil production, consumption and net export/import in selected Arab countries.⁴

Climate Change Impacts

According to several reports including those of the Intergovernmental Panel on Climate Change and the Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR), the region overall is expected to become drier and warmer.

According to RICCAR, the region will witness an increase in temperature ranging between 0.3 °C and 2.4 °C in a moderate scenario of climate change and an increase between 1.1 °C and 3.4 °C in a worst case scenario, with an even higher increase by the end of the century. Morocco as part of the Sahara area will be one of the most affected countries as well as Yemen and parts of Saudi Arabia by the temperature increases.

It is projected that countries of the Arab world will witness longer periods of warming and an increase in number of dry days specifically in countries on the Mediterranean and some parts of the Arab Peninsula.⁶

The IPCC 5th Assessment Report projected that most of the MENA region will experience a decrease in precipitation. By the end of the century, the regions most affected by a decrease in precipitation are the coastal areas

as well as the Atlas and the upper Euphrates and Tigris river basins.⁷ Further, it is expected that the frequency of droughts will increase as well as their duration^{8,9}

The projected climate change will not only impact water availability, agricultural productivity and demand on energy. It will also lead to an increased risk of natural disasters and higher rates of internal and regional displacement. According to one of the projections, the impacts of climate change will decrease agricultural productivity in Lebanon and result in an increase in national net migration of 3.19% between 2010 and 2030.¹⁰

⁷ United Nations and League of Arab States, *Climate Projections and Extreme Climate Indices for the Arab Region*, booklet 2 under the framework of the Regional Initiative for the assessment of the impact of Climate change on water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR), 2015.

⁸ Kim, D., and H. Byun, 2009: Future pattern of Asian drought under global warming scenario. *Theoretical and Applied Climatology*, 98, 137-150

⁹ Collins, M., R. Knutti, et al. 2013: Chapter 12: Long-term Climate Change: Projections, Commitments and Irreversibility. *Climate Change 2013: Impacts, Adaptation and Vulnerability. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*

¹⁰ Haddad, E, et al. 2014. 'Climate Change in Lebanon: Higher-order Regional Impacts from Agriculture', *Region*, 9-24 (1), https://www.aub.edu.lb/ifi/public_policy/climate_change/ifi_cc_texts/Documents/20140224_CC_Nereus.pdf (accessed October 2016).

⁶ *Ibid.*

Population Growth Trends

The population (which already more than doubled in the last three decades) in the region is projected to increase by two-thirds by 2050 with a significant increase in urban population.¹¹ The growth rate in cities of the region is 1-3% Figure 2. Come mid-century Egypt is expected to be the 12th most-populated country in the world.¹² With the increasing trend in population growth as well as consumption patterns, an increase in demand on already scarce resources will naturally occur.

Conflict and Refugees

The increase in population in the MENA region is accompanied by other population challenges such as refugees and internally displaced people that have resulted from regional conflicts. Scarcity in natural resources is considered as a “threat multiplier” to conflict creating a vicious cycle of insecurity.

According to IDMC, half of the top ten countries with the highest internally displaced people due to conflict in 2015 were located in the Arab world.¹³ MENA has the largest refugee population in the world.¹⁴ Countries, such as Lebanon and Jordan, are hosting large numbers of refugees resulting in further pressure and demand on their already vulnerable resources.¹⁵

Interlinkages between Water, Energy and Food

Given the variability in the distribution of water, energy, and food (WEF) resources in the region and the ever-increasing pressures on them, it is imperative that countries of the region enhance their cooperation to deal with these challenges in innovative ways.

Water security, energy security and food security are closely interlinked in a region such as the MENA. Agriculture consumes close to 90% of water in some Arab countries while it

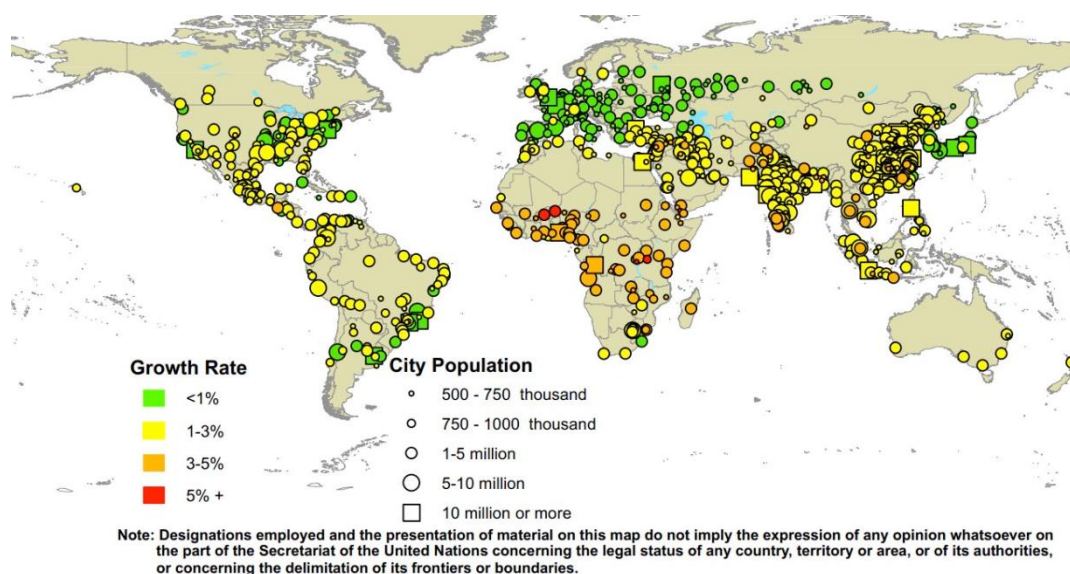


Figure 2 Growth rates of urban agglomerations by size class (2014-2030).¹¹

¹¹ ESCWA, *The Demographic Profile of the Arab Countries*, 2014.

¹² Mirkin, B. 2010. 'Population Levels, Trends and Policies in the Arab Region: Challenges and Opportunities', *Arab Human Development Report Research Paper Series*, United Nations development Programme regional Bureau for Arab States.

¹³ Internal displacement monitoring center, Global Internal Displacement Database, 2016, <http://www.internal-displacement.org/database/> (accessed November 2016).

¹⁴ Population Reference Bureau, *Population trends and Challenges in the MENA*, 2001, <http://www.prb.org/Publications/Reports/2001/PopulationTrendsandChallengesintheMiddleEastandNorthAfrica.aspx> (accessed November 2016).

¹⁵ Lebanese Ministry of Environment, European Union and United Nations Development Program, *Lebanon Environmental Assessment of the Syrian Conflict and Priority Interventions*, 2014, September.

contributes to less than 6% to the GDP. Generation of energy at various stages demands water. For example in Egypt 25% of the electrical generation capacity is based on fresh water systems.¹⁶ Energy is needed to make water available at nearly all stages from extraction to delivery to end users. Desalination, which is highly energy intensive, is a key source of water in the region. Saudi Arabia and the United Arab Emirates alone produce around a third of the desalinated water in the world.¹⁷ In Saudi Arabia, approximately 65 percent of domestic oil use is for desalination¹⁸. It is estimated that close to 15% of the electrical consumption in the Arab world goes into the water cycle.¹⁹ Energy is also needed in food production at different stages starting from pumping needs for irrigation to transportation of produce and finally refrigeration.

With this intricate interdependency between the three resources in a region already scarce in more than one coupled with an ever increasing variability in availability, an integrated or nexus approach to management and cooperation appears to be the evident way forward. The nexus approach, identifies the central sectors as the water-energy-food, and advocates for better physical as well as policy and governance integration.²⁰ 'A nexus approach can support a transition to sustainability, by reducing trade-offs and generating additional benefits that outweigh the transaction costs associated with stronger integration across sectors'.²¹

¹⁶ Siddiqi, A., and Anadon, L. 2011. 'The Water-Energy Nexus in the Middle East and North Africa,' *Energy Policy*, 39 (8), 4529-4540.

¹⁷ United Nations Economic and Social Commission for Western Asia (UN-ESCWA), *Water Development Report 3, Role of desalination in addressing water scarcity*, 2009.

¹⁸ Farajalla, N.S. 2013. "Future of Water Supply and Demand in the Gulf States," in *Water and Food Security in the Arabian Gulf*, Emirates Center for Strategic Studies and Research ISBN 978-9948-14-622-3

¹⁹ Abdel Gelil, I. et al. 2013. *Sustainable Energy in the Arab World: Prospects, Challenges and Opportunities*, www.afedonline.org/report2013/english.html (accessed October 2016).

²⁰ Hoff, H. 2011. 'Understanding the Nexus', Background Paper for the Bonn2011 Conference: The Water, Energy and Food Security Nexus, Stockholm Environment Institute, Stockholm.

²¹ *Ibid.*

The regional landscape; opportunities for cooperation on the WEF security nexus

Institutional opportunities

Governing institutions in the region, being on national or regional levels, are generally structured in a "silo" approach. On the regional level, institutional arrangements and initiatives, under the umbrella of the regional bodies of the League of Arab States (LAS), the United Nations Economic and Social Commission for Western Asia (UN ESCWA), and the Gulf Cooperation Council (GCC), are mandated to collaborate and coordinate among countries on the different elements of the WEF. Examples include the Arab Ministerial Water Council (AMWC), the Arab Ministerial Council for Electricity (AMCE) and the General Assembly of Arab Ministers for Agriculture (GAAMA), the Council of Arab Ministers Responsible for the Environment (CAMRE), and the joint committee on environment and development in the Arab region (JCEDAR).²² Other institutions include Regional center for Renewable Energy and Energy Efficiency (RCREE) which was created in 2008 to enable and increase adoption of renewable energy and energy efficiency in 13 Arab states.

Even though the regional institutional landscape remains mostly sectoral in structure, they may represent an opportunity for enhancing cooperation on the regional level on a WEF nexus approach. Enhancing coordination and collaboration mechanisms amongst institutions is key for mainstreaming the WEF nexus approach at local, national and Arab regional levels, and not necessarily establishing new institutions.²³

Policy opportunities

Several regional strategies on the WEF were developed and adopted by the abovementioned regional institutions. Even though these strategies, in general, follow the same silo

²² Chnais E., et al. 2016. *Water, Energy, Food Nexus: An Outlook on Public Institutions in the Arab World*, Beirut, Issam Fares Institute for Public Policy and International Affairs.

²³ El Hajj, R. and Farajalla, N. 2016. *Nexus Governance and the Role of Institutions*, Policy Brief, The WEF Nexus in the Arab Region Series, the League of Arab States (LAS).

thinking remaining within the different sectors, however some of their objectives may present an opportunity for enhancing cooperation between Arab states in a nexus approach.

The Arab Strategy for water security in the Arab Region to meet the challenges and future needs for sustainable development 2010-2030, and its action plan was adopted by the Arab Ministerial council in 2012 and 2014. The strategy suggests strengthening cooperation among Arab States to manage shared water resources, exploiting the comparative advantages of Arab States in the field of water resources, and enhancing cooperation and exchange of experiences and information between Arab States. The strategy discusses increasing efficiency of water use especially in agriculture and the expansion in the use of non-conventional water sources as “water desalination will become an irreplaceable strategic option for the future”.²⁴

The Arab Sustainable Agricultural Development Strategy: 2005 to 2025 adopted by AOAD (Arab Organization for Agricultural Development) identifies “Water: The Key Determinant for Sustainable Agricultural Development” and calls for Arab cooperation in investing shared water basins, in developing conventional and non-conventional water resources, and in using renewable energy source in water desalination.²⁵

The “Pan-Arab Strategy for the Development of Renewable Energy Applications: 2010 – 2030” was adopted by the 3rd Arab Economic and Social Development Summit of January 2013. The strategy identifies electricity interconnections between countries of the region as a cornerstone in regional cooperation. The strategy discusses in several places the potential and opportunities for untapped renewable energy options especially with regards to water desalination, small hydropower generation, pumping to storage facilities, and pumping for water distribution in

Arab countries. “The study recommends focusing regional cooperation activities on several initiatives that can influence and expedite the countries’ readiness to prepare their National Renewable Action Plans such as exploring potentials and opportunities for untapped renewable energy options, including water desalination, small hydro and pumped storage options”.²⁶

The Arab Framework Action plan on Climate Change adopted by CAMRE in 2010 and The Arab Strategic Framework for Sustainable Development adopted by CAMRE in 2014 could also present an opportunity for integration among sectors and issues.

Comparative advantage of Resources

Having a regional outlook on water, energy and food resources in the MENA, with its wide inter-variability in richness and scarcity, represents an opportunity to make use of the comparative advantage of nations.

The potential for renewable energy in the region is high in most countries especially in North African countries which are already implementing large scale solar power projects. According to the Pan- Arab Strategy for the Development of Renewable Energy Applications: 2010 – 2030, the Arab region enjoys a rich endowment of renewable energy resources, particularly solar and wind energies.

The potential for some countries such as Sudan and Iraq, rich in water and land, to act as the bread basket for the region is high. On the other hand improving transboundary water management could open a window to improved water security.

As the WEF nexus approach aims to support decision-makers in managing resource trade-offs across different economic sectors and actors, adopting such an approach from a regional perspective taking into consideration the comparative advantage could help in securing water, energy and food on national levels.

²⁴ League of Arab States, *Strategy for Water Security in the Arab Region to Meet the Challenges and Future Needs for Sustainable Development 2010-2030*, 2012, http://www.accwam.org/Files/Arab_Strategy_for_Water_Security_in_the_Arab_Region_to_meet_the_Challenges_and_Future_Needs_for_Sustainable_Development_-_2010-2030.pdf (accessed November 2016).

²⁵ League of Arab States and Arab Organization for Agricultural Development, *Arab Sustainable Agricultural Development Strategy: 2005 to 2025*, 2007.

²⁶International Renewable Energy Agency and League of Arab States, *The Pan- Arab Strategy for the Development of Renewable Energy Applications: 2010 – 2030*, 2014, http://www.irena.org/DocumentDownloads/Publications/IRENA_Pan-Arab_Strategy_June%202014.pdf (accessed November 2016).

Increased awareness of WEF nexus

An increased level of awareness of the importance of the nexus approach in Arab states among policymakers²⁷ presents itself as an opportunity for regional cooperation. The Adaptation to Climate Change in the Water Sector in the MENA Region Program (ACCWaM), in collaboration with several academic partners developed in 2016 a series of policy briefs on the Water, Energy and Food Nexus in the MENA region, which was presented to the League of Arab states on its request.

Recommendations [Initial presentation – section will be completed after the conference]

The regional landscape is somewhat favorable for cooperation on nexus approach however some tools might be needed to act as drivers:

- *Developing a solid knowledge base. Understanding the Nexus and Associated Risks policy brief , one of the WEF Nexus in the Arab Region Series, identified bridging the knowledge gap of the WEF nexus at the national and regional levels by understanding and quantifying the inter-linkages between water, energy, and food as one of the main recommendations.*²⁸
- *Technology transfer and innovation within and among countries of the region.*
- *Mobilizing finance towards water, energy and food security projects in an integrated approach conducive to sustainable development and social stability in the region. A possible way forward on climate action in the Middle East would be teaming up of a MENA regional climate organization with an institute from outside the region eligible for climate funding. These partners could then gain access to*

climate financing and leverage private sector funds from the MENA region.

- *Information sharing within and between nations for improved management and planning taking the comparative advantage of different countries into consideration.*
- *Capacity and institutional building for enhanced coordination and collaboration on both the national and regional levels.*
- *Encouraging private sector participation.*
- *Paradigm shift in donor funding and support towards a more integrated approach in program planning.*

²⁷ Chnais E., et al. 2016. *Water, Energy, Food Nexus: An Outlook on Public Institutions in the Arab World*, Beirut, Issam Fares Institute for Public Policy and International Affairs.

²⁸ AL Zubari, W.2016. *Understanding the Nexus and Associated Risks*, Policy Brief, The WEF Nexus in the Arab Region Series, the League of Arab States (LAS).