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Enhancing regional cooperation in the Middle East and North Africa through the Water- Energy-Food Security Nexus

Water, energy and food resources in the Middle East and North Africa (MENA) region are in a critical situation in general but with interregional variations. Additional stressors are projected to aggravate the water, energy and food (WEF) insecurities, most prominently climate change impacts, population trends, conflict and refugees. Given that these resources are closely interlinked and interdependent, many countries in the region could benefit from enhanced cooperation to deal with these challenges in a nexus approach. In such an approach policies strive to optimize measures in the food, energy or water sectors while avoiding their adverse effects. The regional landscape presents opportunities for enhancing cooperation on the WEF security nexus. We recommend options that take account of : i) the existing institutional and governance landscape and differences of interest in that landscape that hinder cooperation; ii) the resulting policy on the regional level; iii) the wide variability in economic prosperity versus scarcity of resources and iv) the increased level of awareness among policy makers regarding the importance of WEF security.

New initiatives are needed to drive this process. These include confidence building measures, working towards a shared and 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, energy and food security in the Middle East and North Africa Region

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 import dependent regions in the world. The richness and scarcity are not pervasive but come with large 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 points.^{4,5} One recent example is the devastating ongoing war in Syria which started as the result of complex interrelated sociopolitical and economic factors including, as well as challenges associated with climate variability and changes in the availability of freshwater.⁶ 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.⁷

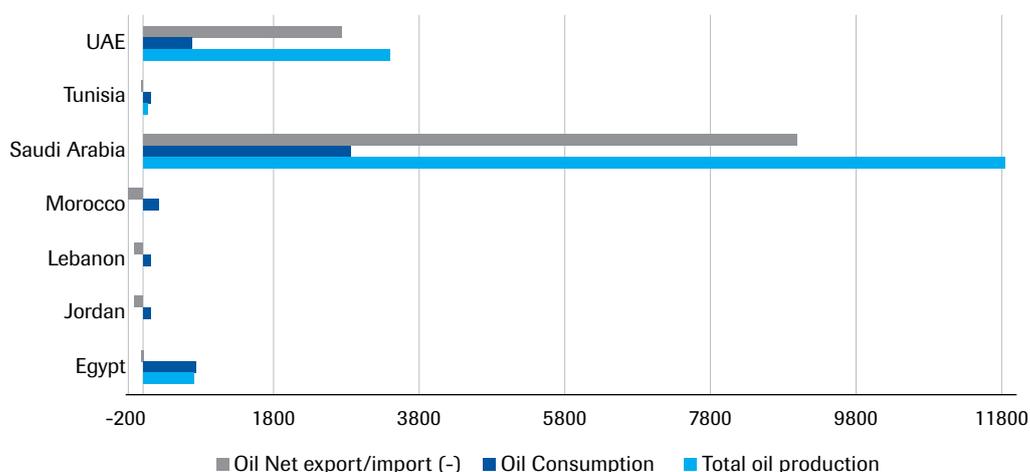
Climate Change Impacts

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

- 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 Steenhuis 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.
- 6 Gleick, P., 2014. 'Water, Drought, Climate Change, and Conflict in Syria', *Energy, Climate and Society*, (5), 331-340. <http://journals.ametsoc.org/doi/full/10.1175/WCAS-D-13-00059.1> (Accessed on March 20, 2017).
- 7 Adapted from 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.

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



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.⁸

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.⁹ Further, it is expected that the frequency of droughts will increase as well as their duration^{10,11}

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 2030.¹²

8 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.

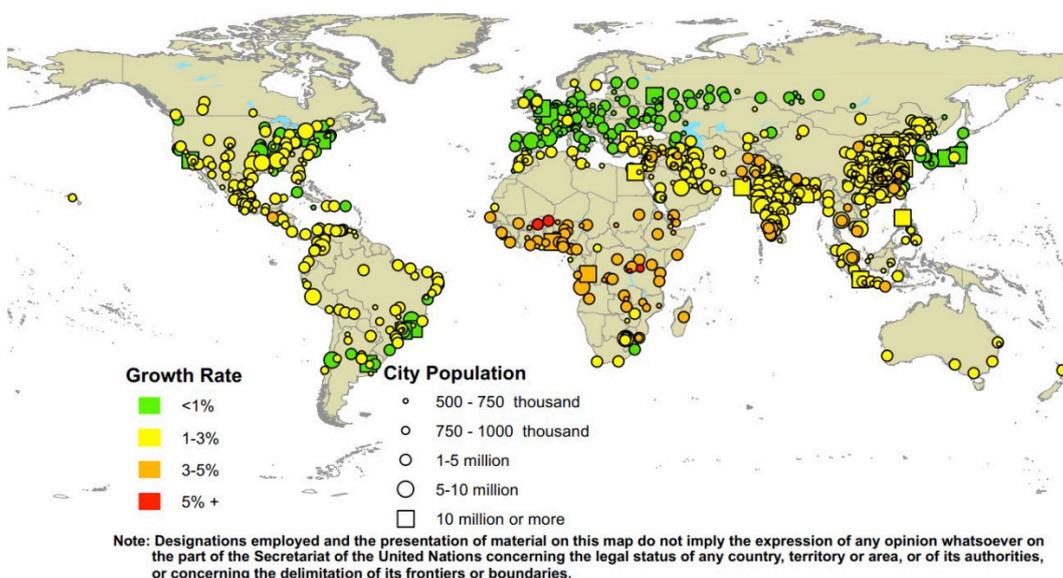
9 *Ibid.*

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

11 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.

12 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).

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



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.¹³ The growth rate in cities of the region is 1-3% (cf. Figure 2). Come mid-century Egypt is expected to be the 12th most-populated country in the world.¹⁴ 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 resulting from regional conflicts. Scarcity in natural resources – considered a “threat multiplier” to conflict, by governments, regional and international organizations – is 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.¹⁵ MENA has the largest refugee population in the world.¹⁶ Countries such as Lebanon and Jordan are hosting large numbers of refugees resulting in further pressure and demand on their already vulnerable resources.¹⁷

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 of significance that countries in the region enhance their cooperation to deal with these challenges in a complementary manner.

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

14 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.

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

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

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

Water, energy 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 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.¹⁸ Energy is needed to make water available at nearly all stages from extraction to delivery to end users. Desalination and re-use, both of which are highly energy intensive, are key sources of water in the region. Saudi Arabia and the United Arab Emirates alone produce around a third of the desalinated water in the world.¹⁹ In Saudi Arabia, approximately 65 percent of domestic oil use is for desalination.²⁰ It is estimated that close to 15% of the electrical consumption in the Arab world goes into the water cycle.²¹ Energy is also needed in food production at different stages starting from pumping needs for irrigation to transportation of produce and finally refrigeration. In other, less rich parts of the region, however, water and energy needed for food production are still lacking.

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 resources management and cooperation appears to be the evident way forward. The nexus approach, identifies water, energy and food as the central sectors and advocates for better physical as well as policy and

governance integration.²² It is an approach that integrates management and governance across sectors and scales.²³ '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'.²⁴

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

Several ways could be envisaged to strengthen cooperation, on different levels being bilateral or multilateral, in the WEF security nexus. This is vital not only in view of the need to reduce scarcities and improve levels of access to affordable food, water and energy to the population of MENA countries, but could also have positive spin-offs for reducing tensions in the region.

Institutional opportunities

Governing institutions in the region, be it at a national or regional level, are generally structured in a "silo" manner - mainly concerned with one sector. At 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 in the Arab region 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

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

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

20 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

21 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).

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

23 *Ibid.*

24 *Ibid.*

Arab Region (JCEDAR).²⁵ Other institutions include the Regional center for Renewable Energy and Energy Efficiency (RCREEE) which was created in 2008 to enable and increase adoption of renewable energy and energy efficiency in 17 Arab states.

Even though the regional institutional landscape remains mostly sectoral in structure, the WEF nexus approach may represent an opportunity for enhancing cooperation at the regional level. Enhancing coordination and collaboration mechanisms amongst institutions is key for mainstreaming the WEF nexus approach at local, national and Arab regional levels, not necessarily establishing new institutions.²⁶

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

The Arab strategy and action plan for water security in the Arab Region to meet the challenges and future needs for sustainable development 2010-2030 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”.²⁷

The Arab Sustainable Agricultural Development Strategy 2005 to 2025, adopted by AOAD (Arab Organization for Agricultural Development), identifies water as the key determinant for sustainable agricultural development and calls for Arab cooperation in investing in shared water basins, in developing conventional and non-conventional water resources, and in using renewable energy sources in water desalination.²⁸

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 the potential and opportunities for untapped renewable energy options in several places, 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”.²⁹

25 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.

26 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).

27 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).

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

29 International 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).

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.

Financial opportunities

Private sector and financial institutions in MENA are willing to invest in developing more sustainable agriculture, water use and energy: they see the growing business opportunities, especially as governments are moving policies in a more sustainable direction. Institutions from MENA could partner with institutions from outside MENA to access climate finance from the Green Climate Fund to invest in climate adaptation infrastructure.

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 without fossil energy sources; these countries 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 comparative advantages could help in securing water, energy and food at national levels.

Increased awareness of WEF nexus

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. Together with other emerging multilateral cooperations, this suggests an increased level of awareness of the importance of the nexus approach in Arab states among policymakers³⁰, which in turn presents itself as an opportunity for regional cooperation.

Recommendations

The MENA region is becoming more aware of the water-energy-food nexus concept and this, to some extent, has created a favourable environment for cooperation within a nexus approach. In order to build on this growing awareness (we suggest that) further initiatives are needed to act as drivers to enhance future intersectoral cooperation:

- Developing a solid knowledge base. Bridging the existing knowledge gap of the WEF nexus at the national and regional levels by understanding and quantifying the interlinkages between water, energy and food is a key starting point.³¹
- Focus on the food supply chain with its significant losses of food, water and energy.
- Support fossil fuel subsidy and water subsidy reform.
- Encouraging and promoting technology transfer and innovation within and among countries of the region.

30 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.

31 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).

- Information sharing within and between nations for improved management and planning taking the comparative advantage of different countries into consideration.
- Capacity and institution building for enhanced coordination and collaboration at both the national and regional levels.
- 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.
- Encouraging private sector participation by reducing capital risks with public (co-)financing.
- Data collection on the economic benefits of sustainability and collection of success stories of private sector investment in sustainability, to enable policy makers to develop sustainability policies.
- Lobby for a paradigm shift in donor funding and support towards a more integrated approach in program planning.
- WEF-related success stories in the region should be studied and disseminated with an eye towards up-scaling.

About the Planetary Security Initiative

The Planetary Security Initiative aims to help increase awareness, to deepen knowledge, and to develop and promote policies and good practice guidance to help governments, the private sector and international institutions better secure peace and cooperation in times of climate change and global environmental challenges. The Initiative was launched by the Netherlands Ministry of Foreign Affairs in 2015 and is currently operated by a consortium of leading think tanks headed by the Clingendael Institute.

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Note: The views expressed by Tessa Terpstra and Anders Jägerskog are not necessarily the views of respectively the Netherlands Ministry of Foreign Affairs or the Swedish Government or the Swedish International Development Cooperation Agency (Sida).