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JOINT COMMENTARY SERIES: **VIEWPOINT**

ADAPTATION TO CLIMATE CHANGE IN THE MIDDLE EAST AND NORTH AFRICA

by Jamal Saghir

1. Context and Challenges[1]

Climate change will have dire and severe impacts on the Middle East and North Africa (MENA) region.[2] The International Panel on Climate Change estimates that the MENA region will be one of the world's regions hit hardest by climate change in the 21st century.[3] Flash floods are being experienced more frequently, as well as storm surges along coastal zones. Extreme and extended periods of heat will transform both rural and urban areas, exposing cities to rising heat island effect and decreasing the productivity of agricultural areas, while placing significant strains on already scarce water resources. They threaten all countries in the region, impacting human lives and health, and causing serious damage to natural and human-made infrastructure and resources. The capacity of the countries in the region to adapt to climate change varies considerably, with the least developed MENA countries being particularly vulnerable. Between 1990 to 2019, economic damages in the region from floods were $5.7 billion from floods and $6 billion from storms.[4]

The MENA is a drastically diverse region in terms of socio-economic and political conditions and confronts the triple crises of climate change, food and water security, and economic crisis. All three are under fragile contexts of conflict and political instability, exacerbating poverty, inequality and underdevelopment.

It is also one region where water scarcity accrues, making it the driest and the most water-stressed region in the world. 12 out of the 17 most water-stressed countries in the World are in MENA. The region is hot and dry, so water supply is low to begin with, but growing demands have pushed countries further into extreme stress. 18 out of 22 Arab States stand below the renewable water resources scarcity annual threshold of 1,000 m3 per capita, and 13 below the absolute water scarcity threshold of 500 m3 per capita per year.[5] Indeed, 60% of its population lives currently in areas of high-water stress, compared to the global average of 35%.

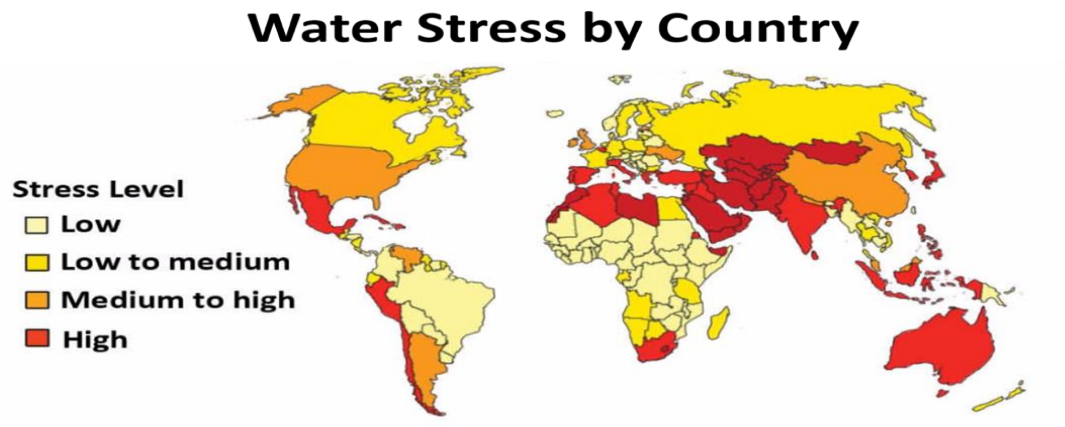
[1] This viewpoint is based on our detailed assessment in the MENA chapter of the Global Center on Adaptation State and Trends in Adaptation Report 2020.
https://www.cas2021.com/press/documents/reports/2021/01/22/state-and-trends-in-adaptation-report-2020.

[2] Algeria, Bahrain, Djibouti, Egypt, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestinian Authority, Qatar, Saudi Arabia, Syria, Tunisia, the United Arab Emirates, and Yemen.

[3] MEI (2017). Climate Change: The Middle East Faces a Water Crisis.
https://www.mei.edu/publications/climate-change-middle-east-faces-water-crisis
https://www.ipcc.ch/sr15/chapter/chapter-3/

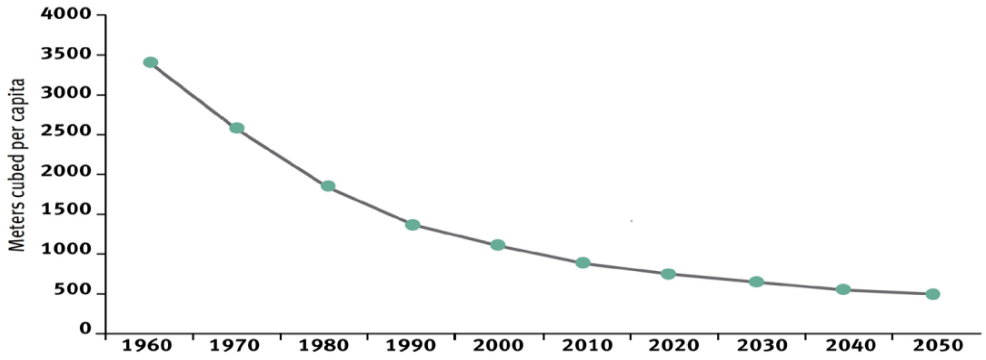
[4] ESCWA, ASDR (2020). SDG 13 chapter, https://asdr.unescwa.org/sdgs/pdf/en/ASDR2020-SDGs/ASDR2020-SDG13.pdf

[5] United Nations Economic and Social Commission for West Asia – ESCWA- (2019). Moving towards Water Security in the Arab Region, E/ESCWA/SDPD/2019/2, p. 19.



Source: World Resources Institute, United Nations

Trend in freshwater resources per capita in Arab countries



Source: Abdul-Karim Sadik, Mahmoud El-Solh, and Najib Saab, eds., Arab Environment 7: Food Security Challenges and Prospects *(*Beirut: Arab Forum for Environment and Development, 2014).

Climate change is set to complicate matters further. In fact, climate change, water scarcity and their interconnection with conflicts in the region have been referred to as a 'confluence of crises'.[6] At times, reduced access to water is both a cause and effect of conflict and displacement. The World Bank estimated that MENA has the greatest expected economic losses from climate-related water scarcity, estimated at 6-14% of GDP by 2050.[7]

The climate challenge for MENA is primarily about adaptation[8]. In addition, according to the recently issued Global Center on Adaptation - **GCA report assessing global progress on**

[6] UNDP and GEF. (2018). Climate Change Adaptation in the Arab States Best practices and lessons learned. Retrieved from: https://www.uncclearn.org/sites/default/files/inventory/arab-states-cca.pdf

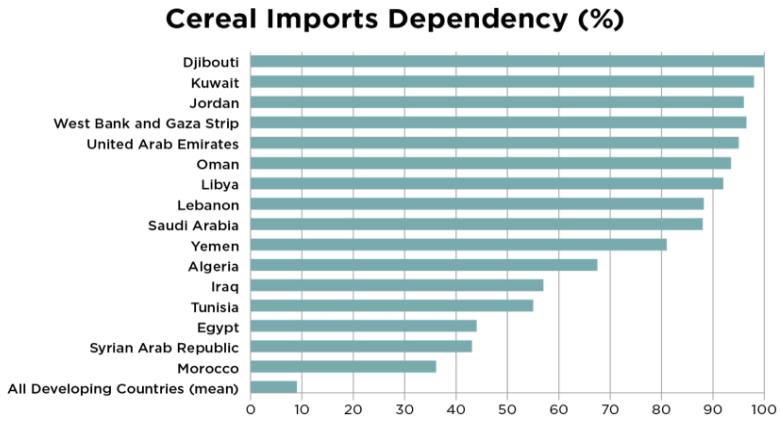
[7] World Bank (2017) Beyond Scarcity: Water Security in the Middle East and North Africa. https://www.worldbank.org/en/topic/water/publication/beyond-scarcity-water-security-in-the-middle-east-and-north-africa**.**

[8] We use the terms adaptation and resilience as defined by the intergovernmental Panel on Climate Change. Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects. Resilience: The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.

adaptation – "climate adaptation in the MENA region is all about water: managing it, conserving it, improving access to it, co-operating over it, and planning for a future of even greater water scarcity and stress".

Water in the MENA is highly interlinked with economic growth, conflict, migration, employment, and human rights, all of which are shaped by the management and access to water resources. Yet water use inefficiencies prevail. Additionally, two thirds of the MENA's freshwater resources cross one or more international boundaries, thus shortages could also instigate growing regional conflict as already poorly managed transboundary water bodies will become harder to govern with unpredictable flows, and the lack of shared data systems among upstream and downstream users.

The MENA is also the highest food-importing region, with a high reliance on rainfed systems and with 85% of water being used for agriculture purposes, exacerbating food security).[9] Despite these challenges, change in water use patterns could have an alternative, favourable effect on food security. This could be achieved with improvements in the balance between natural freshwater scarcity and the population's demand for water. It would entail reducing consumption pressures on the available supply by introducing effective efficiency demand management techniques and reducing substantially on water losses in all sectors.



Source: FAO Stat Sep. 2016

Urban areas are also climate vulnerable hotspots in MENA countries, and urban dwellers are expected to make up 68% of populations in Arab countries by 2050.[10] The rapid and uncontrolled mushrooming of small and medium cities, particularly along coastal lines, is exacerbating the vulnerability of water and food sectors, while also intensifying levels of poverty, inequality, unemployment and informal settlements. This in return is incapacitating cities from providing basic services to inhabitants. Adding to that, the region hosts nearly 15% of the world's refugees (over 9 million) and international migrants the majority of whom have settled in cities, placing further burdens on urban systems.[11]

[9] UNDP and GEF (2018). Climate Change Adaptation in the Arab States Best practices and lessons learned. Retrieved from: https://www.uncclearn.org/sites/default/files/inventory/arab-states-cca.pdf

[10] UNDP (2018). The Arab Cities Resilience Report. Retrieved from: https://www.arabdevelopmentportal.com/sites/default/files/publication/961.mainreportscreen.pdf

[11] ESCWA and IOM (2019). Situation Report on International Migration 2019 The Global Compact for Safe, Orderly and Regular Migration in the Context of the Arab Region (E/ESCWA/SDD/2019/3). https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/situation-report-international-migration-2019-english_1.pdf

The outbreak of COVID-19 has added an additional layer of complexity for the region in terms of addressing water and food security. With the increasing demand for water to help combat the spread and transmission of the virus, along with a higher use of water for agriculture as temperatures increase countries ramp up on national food security, strains on an already scarce resource are occurring, which could lead to higher water tariffs. At the same time, recent trade restrictions, particularly on cereal exports, are also a significant peril for Arab countries, many of which are net importers.[12]

The need to consider food security in an increasingly arid region through prioritizing climate adaptation and resilience is crucial. The pandemic also laid bare inherent structural inequalities in the Arab region, disproportionally affecting vulnerable communities such as daily wagers, refugees, elderly, women, and people who live under occupation and in warzones. Poverty levels have already soared to account for 115 million people, or one quarter of the total Arab population.[13] These alarming social impacts have left a big proportion much more vulnerable to cope with climate impacts and will need to be addressed while planning for climate adaptation, to ensure no one is left behind.

2. Progress in Adaptation

There is improvement in regional understanding of climate change impacts and adaptation techniques and addressing climate change effects on the sectors in the region. It has been shaped by the Arab Climate Change Assessment Report issued under Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) which highlights adaptation as a key pillar of climate action, identifying five priority sectors for the region, namely: (1) water availability; (2) biodiversity and ecosystems, including (a) forests, and (b) wetlands; (3) agriculture, including (a) water available for crops, and (b) water available for livestock; (4) infrastructure and human settlements, focused on inland flooding; and (5) people, including (a) water available for drinking, (b) Health conditions due to heat stress, and (c) employment rate for the agricultural sector. [14] RICCAR regional climate modelling outputs are informing Aqua Crop simulation to project the impact of climate change on agricultural output of strategic crops, such as wheat and sorghum. Supplemental irrigation schedules and sowing seasons are being adapted to change seasons and crop growing cycle.

Nevertheless, adaptation trends in the region remain diverse and at small scale. It includes building the resilience of agro-pastoralists from drought and shifting growing seasons through new crop varieties and seasonal forecasts; pursuing investments in non-conventional water resources to offset water scarcity, such as through treated wastewater reuse and the use of renewable energy for desalination; and disaster risk reduction initiatives, such as reducing vulnerabilities of coastal communities from storm surges and sea level rise, and land use reclamation projects that aim to combat sand and dust storms. Moreover, positive adaptation

[12] UNDP (2020). Arab countries respond to COVID-19 Heightening Preparedness Integrated Multi-Sectoral Responses Planning for Rapid Recovery. Retrieved from: https://www.arabstates.undp.org/content/rbas/en/home/coronavirus.html

[13] UN (2020). The Impact of COVID-19 on the Arab Region: An Opportunity to Build Back Better. *Policy Brief*. Retrieved from: https://www.un.org/sites/un2.un.org/files/sg_policy_brief_covid-19_and_arab_states_english_version_july_2020.pdf

[14] ESCWA et al. (2017). *Arab Climate Change Assessment Report – Main Report*. Beirut, E/ESCWA/SDPD/2017/RICCAR/Report.

innovations are starting to take place in MENA, such as Morocco's nation-wide efforts on groundwater management; Jordan's efforts to harness private sector innovation, financing for recycling wastewater, and to enhance supply through desalination; Saudi Arabia pursuing reforms to reduce untargeted subsidies and enhancing the role of private operation in support of public interest outcomes; and Egypt's renewed focus on strengthening local accountability for water supply and sanitation services – particularly in under-served rural areas.

On the other hand, given the huge adaptation challenges facing MENA, implementing adaptation project has been generally slow. For instance, the approach to water in the region has been largely supply-led and implemented through a siloed approach, with a main focus on access and infrastructure, while resilience interventions remain in their infancy. With water being at the heart of development and security challenges, investments in the sector are expected to be significant. However, development funding for water in MENA has been declining. Since 2006, it has been the only region which has witnessed significant declines in water disbursement volumes, receiving less than half of the volumes destined for Sub-Saharan Africa and Far East Asia in 2013.[15]

Adding to that, adaptation funding in the region is less than a third than that of mitigation, with the MENA receiving the lowest finance for adaptation. Arab States received USD 4.6 billion bilateral flows in 2016, including USD 3.7 billion for mitigation, 0.7 for adaptation, and 0.3 billion for cross-cutting actions.[16]. Finally, poor resource management remains prevalent in the MENA, with efforts remaining insufficient to improve agricultural water productivity. [17]

3. Main Issues and Opportunities

Agriculture: Under threat

The agricultural sector, of which 70 percent is rain-fed, is highly exposed to changing climatic conditions. This is of critical importance as the agriculture sector - a source of income and employment in the region - will diminish more in the short-to mid-term. Climate change wil likely decrease agricultural output due to heat stress and reduced available water leading to food scarcity, resulting in decreasing employment opportunities and potential economic downturns and posing to significant challenges to its development[18]. Local tensions over access to food and water resources can spill over into neighboring countries, as people seek to find additional resources and safety, placing more strain on the resources of those countries, which could amplify tensions. In these instances, climate change does not directly cause conflict over diminishing access to water, for example, but it multiplies underlying natural resource stresses, increasing chances of a conflict and contributing to migration flows, often to urban areas as already observed.[19]

[15] Saghir, J. (2018) Water Security and Growth: The case of the Middle East and North Africa Countries. Institute for the Study of International Development, McGill University, Montreal, Canada. Retrieved from: https://www.mcgill.ca/isid/files/isid/pb-2018-01._saghir.watersecurity.pdf
[16] ESCWA (2019). Climate Finance in the Arab Region, Dec 2019
[17] UNDP and GEF (2018). Climate Change Adaptation in the Arab States Best practices and lessons learned. Retrieved from: https://www.uncclearn.org/sites/default/files/inventory/arab-states-cca.pdf
[18] The World Bank. http://documents.worldbank.org/curated/en/894251519999525186/pdf/123806-REVISEDBLOG-CC-REGIONQN-002.pdf
[19] Waha, K., Krummenauer, L., Adams, S. *et al.* (2017). Climate change impacts in the Middle East and Northern Africa (MENA) region and their implications for vulnerable population groups. Reg Environ Change 17, 1623–1638 . https://doi.org/10.1007/s10113-017-1144-2

Water Innovation: Game- changing

Solutions to the growing problem of water scarcity in the region are within reach. The challenge is to accelerate and leapfrog the development and spread of innovation for sustainable water management. Innovative monitoring technologies (such as remotely controlled pumps and smart water meters) could help address some of the challenges. Moreover, as is already happening in Jordan and other countries, use of remote sensing techniques help governments control the expansion of groundwater-based irrigation. Solar-powered irrigation schemes in Morocco and Egypt, taking advantage of lower costs for solar technology and the region's high solar radiation is replacing expensive and polluting diesel pumps.[20] Some of the other technological innovations, include Low Temperature Distillation which utilises waste heat or solar energy in desalination and other processes. This method reduces the carbon footprint of desalination plants as it also reduces operating costs.

Many technologies are also available to treat and reuse wastewater - 80% of which is not being recycled in the region, compared to just 30% in high-income countries - for productive purposes, including forestry, agriculture, landscaping, and aquifer recharge. The capture and use of these innovative options at scale have so far been slow in the MENA region because of institutional and policy divisions, and stringent regulations.

Urban resilience: Key for sustainability

The MENA cities are vulnerable to severe impacts from a range of challenges, shocks and stresses that can be both natural and human made. Sustainable cities growth needs to be disaster sensitive. From emergency planning to infrastructure investment, from adaptations in urban planning to risk financing, and countless other areas. Resilience and sustainability are two complementary paradigms of urban development in MENA and it is time should go beyond conventional approaches to 'risk reduction' and advocates for a forward- looking approach to these cities, encompassing resilience, spatial, physical, functional, and organizational dimensions of any human settlement. [21]

Fragmented institutions continue to hinder implementation

Institutions in the MENA are highly fragile, and the majority do not have the capabilities of addressing and responding to climate impacts and implement adaptation solutions. The design of the adaptation projects in the region should aim to address several institutional, regulatory, financial, technological and informational barriers that plague the region weak institutional capacities to address climate change and adaptation across sectors and institutional structures. The aim should be to integrate adaptation actions across all relevant ministries such as environment, finance, agriculture, water, energy and foreign affairs. A multi-sectoral approach will facilitate the integration of adaptation into development plans, annual budgets and policies.

Capacity building: To support mainstreaming adaptation

[20] Saghir J (2019) Innovation to Drive Water Security in the Arab Region. https://payneinstitute.mines.edu/wp-content/uploads/sites/149/2020/09/Payne-Commentary-Series-Innovation-A-Game-Changing-to-Drive-Water-Security-in-the-Arab-Region.pdf

[21] Saghir J (2019). Urban Resilience: The case of the Middle East and North Africa region https://payneinstitute.mines.edu/urban-resilience-the-case-of-the-middle-east-and-north-africa-region/

Awareness of climate risks and ways of building resilience remain poor in the region. Despite progress to improve understanding of climate change impacts on the region, climate adaptation has largely remained in the realm of the environmental sector, with slow, but increasing engagement by the water and agricultural sectors. More effort is needed to mainstream climate change national and sectoral adaptation development planning through costing, mapping and climate proofing exercises to mobilize policymakers and partners to pursue climate adaptation as a core component of green recovery and development efforts.

Climate finance: Directed towards climate-resilient projects

Adaptation finance globally reached $30 billion in 2017-18. The MENA region received just 6 percent of global climate finance and there is no indication that climate finance flows to the region have improved since the 2015 Paris Agreement. Moreover, climate funding is not only skewed towards mitigation, which receives four times more than adaptation, but it also benefits only a handful of Arab states. According to the OECD and ESCWA, over 90 percent of the flows between 2013 and 2018 have gone to Egypt, Iraq, Jordan, Lebanon, Morocco and Tunisia, with roughly 60 percent to Egypt and Morocco alone. Meanwhile, the least developed Arab countries, including Djibouti, Mauritania, Somalia, Sudan and Yemen, received only 4.3 percent of the climate finance support provided to the region.[22] [23]

Regional crises and conflicts have also affected the ability of countries to access climate finance for adaptation, with international public climate finance flows to some countries sometimes stymied by civil unrest or sanctions.

Greater Effort needed is needed to mobilize and integrate external climate funds into national budgets, and ways to manage the variability in flows in planning cycles.[24] Funding needs to be directed towards climate-resilient and sustainable projects, with Multi Development Banks MDBs increasingly aiming to formulate policies to direct funds towards such projects, such as with the Islamic Development Bank's new Climate Change Policy and the World Bank climate actions. New financial instruments are also taking hold in the region, such as the use of green bonds and debt-for-climate swap mechanisms. But more is needed to mainstream climate risk considerations, including, use of liquidity support that incorporates climate risk; reduced insurance premium payments for climate risk insurance schemes; and public-private partnerships to address climate risks.

4. The Way Forward: Policy Actions

Addressing climate risk in the design and implementation of climate-resilient projects is an immediate priority for the MENA region. The COP 21 Paris Agreement increases opportunities for climate-smart investment in the region's infrastructure including energy, transport, water and agriculture, and sends a decisive market signal that the transition to a thriving resilient economy is

[22] OECD (2020). Climate Change: OECD DAC External Development Finance Statistics. https://www.oecd.org/development/climate-change.htm.
[23] ESCWA (2020). Debt Swap for Climate and SDGs Finance in the Arab Region ESCWA Discussion Paper. Forthcoming.
[24] ESCWA and IsDB (2019). Expert Group Meeting on Mainstreaming Climate Action into National Development Planning in the Arab Region: Meeting Report, Amman, 25-27 November 2019. https://www.unescwa.org/sites/www.unescwa.org/files/events/files/climate_mainstreamining_egm_report-final_4may2020.pdf

inevitable, with an important role for private sector and private investment in climate adaptation solutions. It is thus imperative to invest in resilient infrastructure, including water management (irrigation, hydropower, water supply, and flood control), roads, bridges, energy etc.[25]

The climate change challenge for the MENA countries is making development climate resilient. This requires the improvement of the knowledge of climate impacts and effective technologies and their application; integration of climate considerations into development policies and plans (e.g., siting and building standards of large infrastructure projects, city design, land use planning sound agriculture and irrigation policies); and building local capacity for improved preparedness and adaptation. In the the GCA State and Trend on adaptation 2020 report we highlighted the following strong recommendations:[26]

- **An integrated approach is needed placing water and water-dependent sectors at the centre of solutions**. Water Adaptation in MENA should include prioritizing adaptation action in transboundary water basins, given that over two-thirds of the region's freshwater resources traverse one or more international boundary, with climate change impacts on those resources having important implications for climate security, water, energy and food security, rural livelihoods, and economic development. Adaptation needs to be mainstreamed in national and sectoral planning. Mainstreaming must seek to maximize synergies across sectors and build coherence at all levels. This requires policy integration and harmonization, horizontally and vertically, at the national level between sectors, at the regional level between regional and national strategies, and at global level between water-related agendas and national goals and targets.[27]

- **Adaptation to climate change is about the socio-economic welfare of urban and rural communities and the ability of strategic sectors to deliver on public needs.** Adaptation in the region needs to consider the implication of climate change on natural and man-made ecosystems, the water-energy-food nexus, and urban and rural development. This includes adapting the agricultural sector to climate impacts on water, soil moisture in strategic crops needed to sustain national food security objectives and rural livelihoods, as well as agricultural commodities for export needed to generate foreign revenue streams. Urban centres in turn need to be supported to adapt to extreme climate events such as flash floods that affect road networks, drinking water infrastructure and wastewater; sand and dust storms that affect the aviation sector, road networks and human health, as well as hydropower production and electricity consumption needs during heat waves and cold spells.

- **Open and participatory approaches are needed.** Adaptation needs to consider regional, national and local needs and priorities, and make communities and private sectors joint actors with public institutions in climate adaptation. This requires capacity building, institutional and regulatory frameworks to ensure openness and transparency, as well as adaptation metrics for informing on process and moving it forward. Regional and localized knowledge platforms that provide open and easy access to information to support understanding, action and access to resources can facilitate this process. A multitude of

[25] Saghir. J (2019) Climate Change and Conflicts in the Middle East and North Africa https://www.aub.edu.lb/ifi/Documents/publications/working_papers/2018-2019/20190724_climate_change_and_conflicts_in_the_middle_east_and_north_africa.pdf
[26] https://www.cas2021.com/press/documents/reports/2021/01/22/state-and-trends-in-adaptation-report-2020
[27] ESCWA (2019). Moving towards Water Security in the Arab Region, E/ESCWA/SDPD/2019/2, p. 101.

new information has become available through satellite imagery, remote sensing, sensors and telemetry at the plant level, and artificial intelligence that is also creating a new knowledge base that can help improve water and food security at the local, national and regional levels.

- **Investing in institutions**: fragile institutions remain the norm in many MENA countries. In addition, climate interventions are usually confined to the mandate of one ministry, instead of being integrated across ministries and local authorities, facilitating a multi-sectoral approach. Strong institutional reforms which foster increased coordination, will need to be accompanied with a mainstreaming sustainable development and climate adaptation across institutions. Capacity building should also be targeted to facilitate institutions' access to climate funds.

- **Soliciting climate needs-based finance**: local and international actors in the MENA are already promoting a needs-based climate finance approach. Despite the recognition of adaptation as a priority area for 18 Arab states, efforts need to be scaled to include a national assessment of adaptation needs, including recognition of sub-sectoral and cross-sectoral needs, as well as project identification and costing estimations. Moreover, creating an enabling environment for investments in adaptation is crucial, along with the design of bankable projects, which unlock the currently weak private sector participation in the MENA.

- **Investing in resilient city assessment, planning to prepare and respond to hazards.** Unprecedented urbanization trends would continue to transform MENA cities into unique hubs for services and housings, and to fulfil the promise of social inclusion and better social and economic opportunities for all citizens. Most MENA governments have embarked in some forms of resilience and spatial interventions – several cities are developing Strategic Development Plans linking development and urban renewal and resilience plans under a broader vision. But to implement these plans successfully and manage increasingly large and complex urban systems, there is a need for: (1) better coordination between central and local level; (2) increase participation of private sector in urban development; (3) devolution of responsibilities to local authorities and local budgets for implementation; and (4) make sure that fast growing cities don't lock in high rates of carbon emission or put people at further risk of disaster. MENA countries must work between the public and the private sector and build resilience in all cities in MENA across sectors.

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ABOUT THE AUTHOR

Jamal Saghir

Jamal Saghir is a Professor of Practice at the Institute for the Study of International Development at McGill University, Montreal, Senior Fellow at the Payne Institute, Colorado School of Mines; Distinguished Fellow at the Issam Fares Institute for Public Policy and International Affairs (IFI), American University of Beirut (AUB), and former Director at the World Bank, Group, Washington DC.

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