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MATERIAL FACTORS FOR THE MENA REGION: DATA SOURCES, TRENDS AND DRIVERS

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Emanuela Menichetti, and Sven Biscop



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ABSTRACT

This background paper on material factors in the MENA region selects key datasets for understanding past and present demographic, environmental, energy, economic and military transformations. It introduces the key literature relating to each factor and it identifies the most appropriate databases to assess the conditions in the MENA region. Using these databases, the ways in which material factors are subject to transformation are illustrated through graphs that underpin the central issues. Finally, the paper concludes with an assessment of the relative role of material factors in shaping the regional order and the policy options available to the European Union. To do so, it provides a list of scenarios that will be used by Work Package 3 to build a MENARA interactive tool based on the already existing WaterWorld platform and other international datasets.

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INTRODUCTION

The purpose of this background paper is to provide a preliminary analysis of material factors affecting the studied region of the Horizon 2020 research project Middle East and North Africa Regional Architecture (MENARA). It will define the topical scope for Work Package 3 (WP3), which analyses trends in material factors in the MENA region that affect its socio-economic and political development as well as its relation to the global economy.

Several underlying material fundamentals with wide-reaching effects on the geopolitical order of the whole region have contributed to the dramatic changes affecting the political landscape of the MENA. For example, food price volatility caused by international market developments vis-à-vis local mismanagement of natural resources, the environment and the economy were one driver of the discontent that contributed to regime change in Tunisia, Egypt and Libya (Zurayk 2011). However, other factors contributed as well, such as population growth, energy insecurity, the role of the military and general economic indicators. Understanding these material factors is crucial for informing other Work Packages that deal with political and cultural factors, social values, political formations, war, conflict, revolution or transition.

This paper is a first step in a joint endeavour to better understand how these material factors have developed over time and have shaped (and are likely to shape) the regional order. This background paper presents key datasets, statistics and drivers of five material sets of factors, namely demographic, environmental, energy, economic and military trends. The emerging regional order in the MENA region will have a significant impact on the EU. Therefore, this paper provides some initial reflections on how material factors will also condition European policy options in this region.

1. DEMOGRAPHIC TRANSFORMATIONS

Demography is a dominant challenge in the MENA: with a yearly growth rate of 2.2 percent, its population of 500 million in 2010 will double within 32 years (Cammatt et al. 2015:35). While still considerable, this growth is less pronounced than in the past 60 years, when population numbers increased more than fourfold. Fertility rates in some countries have come down considerably and are now around and sometimes even below the replacement level of 2.1 children per woman (e.g. Iran, Turkey, Lebanon, Tunisia). However, population growth will only level out after 2050 once strong cohorts who are now of childbearing age have migrated through the population pyramid (UNDESA 2016). In some countries, for example Egypt, there has also been a reversal of falling fertility rates (Fargues 2012). MENA infant mortality rates, at 21 per 1,000 births, is below the average for Sub-Saharan Africa (63.8), South Asia (46.6) and least-developed countries in general (57) (Cammatt et al. 2015:130).

Seventy percent of the MENA population now lives in urban areas. The youth bulge peaked in North Africa in the 1970s and in the Middle East in the 1990s, yet half of the population is under 24 years of age and two-thirds under 30 years of age. Like other countries in the developing world, many MENA countries faced a debt crisis following the development policies of imports substituting for industrialization in the post-war decades left them with increasing balance of payment problems (Waterbury 1983, Henry and Springborg 2010). Because of sluggish growth

during the “lost decade” of the 1980s and lack of absorption capacities, much of this youth bulge could not be integrated into the formal labour market. In contrast to Asian emerging markets in the 1960s, there was no “demographic dividend”. The MENA countries have low female labour market participation (only 22.9 percent in 2011 in Arab countries) with considerable variations from country to country (Cammatt et al. 2015:133). In the oil-rich Gulf countries the peculiar labour market situation is marked by a high share of predominantly male expatriate workers, a problem that Gulf governments have tried to tackle with policies for workforce nationalization (Hertog 2012).

There will be a continuous need for job creation for the foreseeable future as a vast majority of the population is under 30 years of age. The labour force is expected to expand rapidly in the coming years. Demographic pressure might be even more intense if women become part of the active labour force. All countries in the region are experiencing serious problems in absorbing this mass of youth into labour markets, but also in ensuring that basic services and infrastructures are provided. After the Arab spring uprisings in 2011, there are serious concerns about the political situation in the region. Economic activity has decreased, making it more difficult for governments to implement labour market policies and reforms aimed at improving the functioning of the labour market. In addition, the refugee crisis arising as a consequence of the Syrian conflict is having a significant impact on the labour markets of recipient refugee countries, such as Jordan and Lebanon. The promotion of job creation programmes for the youth is crucial.¹

1.1 KEY DATASETS

The MENA countries all gather data through respective statistics departments. Given the sensitivity of population data in the light of refugee flows and local validity of data, population data should be treated with extreme caution. Most datasets are effectively estimates (Melamed 2014). It is therefore advisable to use even datasets compiled by reputable international organizations such as the United Nations (UN) and the World Bank with caution (Fargues 2012), because some countries in North Africa have in fact experienced increased birth rates in the past decade. The most appropriate datasets are the followings:

- **UNDESA Population Division** | <https://esa.un.org/unpd/wpp/DataQuery>

UNDESA/United Nations Department for Economic and Social Affairs is the most comprehensive database for population data. It allows users to select regional and by-country data (national level). Both historical and projected data is available for each MENA member state. Data can be downloaded to Excel files, which makes UNDESA's website an easy-to-use database (UNDESA 2016).

- **World Bank** | <http://data.worldbank.org/indicator/SP.POP.TOTL>

The World Bank does not compile data itself but uses population data from the United Nations Population Division; World Population Prospects; census reports and other statistical publications from national statistical offices; Eurostat: Demographic Statistics; the United Nations Statistical Division: Population and Vital Statistics Report (various years); the US Census Bureau: International Database; and the Secretariat of the Pacific Community: Statistics and Demography Programme.

1 See SAHWA Project reports, <http://www.sahwa.eu/OUTPUTS/Publications>.

The website itself is slightly better designed compared to the UNDESA page. However, the level of data is not as deep as it is in the UNDESA database (World Bank 2016).

- **WorldPop** | <http://www.worldpop.org.uk>

WorldPop compares census data with satellite imagery to map population growth. As the website explains, “high spatial resolution, contemporary data on human population distributions are a prerequisite for the accurate measurement of the impacts of population growth, for monitoring changes and for planning interventions. The WorldPop project aims to meet these needs through the provision of detailed and open access population distribution datasets built using transparent approaches.”²

It is an open-source, dynamic and visual tool for mapping population trends. It is especially useful for mapping social developments (urbanization, poverty, health) in relation to population data.

- **UN-Habitat Database** | <http://urbandata.unhabitat.org>

The urban data knowledge database by UN-Habitat provides data from UNDESA for urban areas. It usefully maps urban developments using a wide range of population, economic and health indicators. However, the tool’s weakness is its own regional classification. For UN-Habitat, Turkey is part of Europe; the Middle East consists of the Gulf Cooperation Council (GCC), Levantine, Israel and Iran; North of the Sahara states include Sudan and Mali. The database also does not include the wider metropolitan region of MENA cities, which conflicts with data from UNDESA.

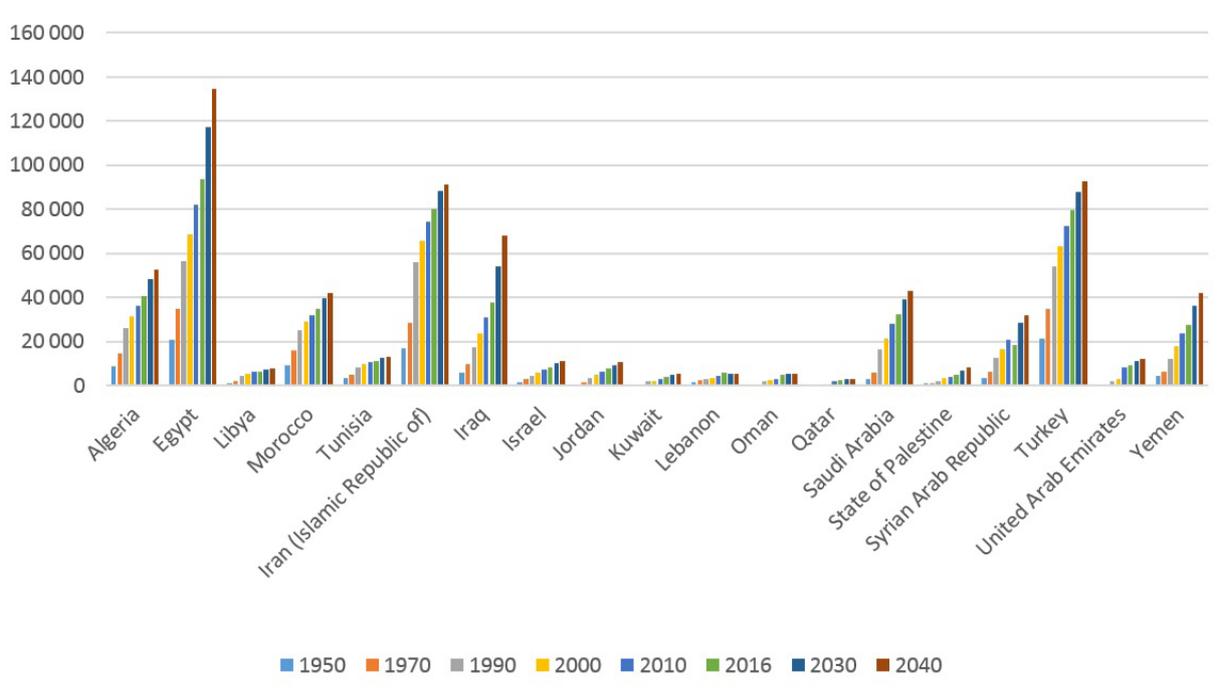
- **LandScan** | <http://web.ornl.gov/sci/landscan>

This commercial population tool uses an innovative approach; with Geographic Information System and Remote Sensing, ORNL’s LandScan™ is the community standard for global population distribution. At approximately 1 km resolution (30” X 30”), LandScan is the finest resolution global population distribution data available and represents an ambient population (average over 24 hours).

The MENARA project’s WP3 will use data from UNDESA and WorldPop to analyse demographic transformation in the MENA region. Despite the warnings from Fargues (2012), data gathered by international organizations still represents the most widely used and tested data in global demography. Having said this, the MENARA project will highlight the estimated nature of data in each publication.

2 See Worldpop website: *What is WorldPop?*, <http://www.worldpop.org.uk>.

Figure 1 | Population growth in MENA countries 1950-2040 (both sexes)



Source: UNDESA 2016.

1.2 KEY DRIVERS FOR THE MENA REGION (1950-PRESENT): POPULATION GROWTH, URBANIZATION, YOUTH AND MIGRATIONS

The MENA countries have been growing fast. While in the 1950s, the total number of people in the MENA countries totalled 102-134 million, the number almost tripled to 303-339 million in 1990 (UNDESA 2016). In terms of population growth, the MENA countries were affected by strong migration patterns. While North African countries grew organically by almost 2-3.5 percent per year, the West Asian countries of the MENARA project experienced significant differences thanks to the political-economic developments in the region. While the Occupied Palestinian Territories saw a net loss of population during the Arab-Israeli wars (with increases seen again later), Jordan and the Gulf states experienced population growth patterns of 10-20 percent growth. The Hashemite Kingdom of Jordan was particularly affected during the Arab-Israeli wars; the Gulf states saw a strong net population increase from 1975-1985 when demand was high for foreign workers in the hydrocarbon industry.

The MENA region's population is growing fast. Its population has doubled in the three decades since 1980. In 2015, the total number of people living in the MENA countries is 493 million. It is expected to add another 110 million people by 2030, which translates into an average annual growth rate of 1.8 percent (Economist 2016). This is almost twice the global population growth rate of 1 percent. In 2050, it is estimated that the total number of people living in the MENA countries will be 730 million (UNDESA 2016). It is therefore one of the fastest-growing regions in the world, and this growth will put immense pressure on national resources and the environment.

Another important trend in the demography of MENA countries is rapidly increasing urbanization. The MENA region has the fastest-growing urban populations in the world, with approximately 70 percent of inhabitants living in cities. The urban hotspots are the GCC countries, Egypt and Turkey. The latter two are home to the region's only two mega cities (defined as more than 10 million people), Cairo (18 million) and Istanbul (14 million), which are both growing, yet much less rapidly than their South and East Asian counterparts. While Cairo is predicted to reach 24 million, Istanbul is predicted to grow to 16 million by 2030. However, the MENA region is also home to cities in the second category of large urban settlements (5-10 million inhabitants). These cities are Tehran, Jeddah and Baghdad (UN-Habitat 2016). In terms of age structure, the MENA region is defined by young people. One-third of the population is younger than 15 years of age. This will further increase population pressures in the region when these youngsters reach childbearing years and enter the labour market (Economist 2016).

The MENA region also has a history of international and regional migration. There are three types of migration patterns. The first is forced migration and internal displacement as a result of crises and conflicts across the region, particularly in Iraq, Libya and the Syrian Arab Republic. The second is economic migration within the region and transiting through the region, with the particular destinations being Europe, as well as towards Gulf countries. In recent years, North Africa has become a hub for transiting migrants from Sub-Saharan Africa, who seek to enter Europe via the illegal and dangerous crossing of the Mediterranean Sea from Libya and Egypt. In addition, Syrian refugees have entered Europe through Turkey, Greece and the Balkans. Third, there is a movement of (regular and irregular) labour migrants both within and from outside the MENA region. These migrants come from Sub-Saharan Africa, East and South Asia and even the countries of the former Soviet Union, seeking employment in GCC countries but also in Lebanon, Jordan, Egypt and Morocco (IOM 2016).

2. ENVIRONMENTAL FACTORS

The environment in the MENA region has been a concern for many scientists and decision-makers in recent decades. As Allan notes, "the MENA region had in practice run out of water [...] in the 1970s" (Allan 2001:317). Water resources (both surface and groundwater) have been gradually depleted, leaving the region heavily dependent on the world market to procure food. These "virtual water imports" have allowed the MENA region to enjoy a "form of food and water security" thanks to readily available food from global food bowls such as North and South America (Allan 2011, Keulertz and Woertz 2015a and 2015b, Woertz 2013). The MENA region is and will remain the largest importer of staple food commodities such as wheat, soy, sugar, rice and animal feed. Without access to the world market, the MENA region would face a dire future. Although some academics have pointed to climate change as a reason for the outbreak of the war in Syria (Gleick 2014, Parenti 2011), one should treat environmental factors with caution. The dismal environmental situation in the MENA region undoubtedly contributes to political, social and economic problems. However, environmental factors are not the root cause of political and social unrest, only contributing factors. The same is true for increasing levels of land degradation. About one-third of Arab land is severely degraded due to overuse of pesticides, mono-cropping and over-exploitation of land resources for grazing and crop growth (van Schaik and Dinnissen 2014).

Environmental factors take a heavy toll on the region's ability to achieve food and nutrition security. Dependence on the world market especially raised eyebrows among decision-makers during the 2007-08 and 2010-11 food price spikes. As some researchers have noted, the volatility of food prices could increase the vulnerability of the region to future price shocks (Ianchovichina et al. 2012). Arab governments have been among the most agile investors in farmland in developing and industrialized countries. This so-called "land grabbing" has been heavily criticized by the international community due to its murky nature. Although Arab governments were linked to a wave of investments in land in the post-2008 period, very few (if any) investments materialized (Verhoeven and Woertz 2012). Moreover, climate change will also take a toll on the region. Recent studies suggest that a changing climate could lead to increased incidence of heat waves leaving areas such as the Gulf states uninhabitable for human beings (Pal and Eltahir 2015). In many ways, environmental factors may be the crucial bottleneck for economic and social development in the coming decades.

2.1 KEY DATASETS

The MENARA project will use WaterWorld for environmental analyses. As opposed to other tools, WaterWorld is an analytical platform used for testing interventions as well as visualizing the baseline. This means WaterWorld doesn't provide static data, but rather dynamic data. At present, WaterWorld is a test bed for the development and implementation of land- and water-related policies for sites and regions globally, enabling their intended and unintended consequences to be tested *in silico* before they are tested *in vivo*. WaterWorld can also be used to understand the hydrological and water resources baseline and water risk factors associated with specific activities under current conditions and under scenarios for land use, land management and climate change. It incorporates detailed spatial datasets at 1 square km and 1 hectare resolution for the entire world, spatial models for biophysical and socio-economic processes along with scenarios for climate, land use and economic change. A series of interventions (policy options) are available which can be implemented and their consequences traced through the socio-economic and biophysical systems. The model integrates with a range of geobrowsers for immersive visualization of outcomes. WaterWorld will be updated with information from other datasets. For the environmental side, WaterWorld provides data on climate change, run-off and land use change. Other datasets that will be used for environmental data are:

- **Arab Spatial** | <http://www.arabspatial.org>

Arab Spatial is an interactive mapping and charting tool covering 22 countries in the MENA region. With this tool, users can quickly visualize, compare and monitor a wide range of indicators on food and nutrition security, poverty and development across the Arab world. The tool focuses on monitoring the region's progress towards the Sustainable Development Goals (SDGs), particularly SDG1 (Ending poverty in all its forms everywhere) and SDG2 (Ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture). Countries covered in the atlas include: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen. However, Arab Spatial does not include Turkey, which would need to be added, through e.g. TurkStat (the official statistics website of the Turkish government).

- **FAOSTAT** | <http://www.fao.org/faostat/en>

FAOSTAT of the Food and Agriculture Organization (FAO) of the United Nations provides the most comprehensive dataset on agricultural data. The data includes agricultural production, prices, agricultural emissions, ASTI R&D indicators, trade, investment, emissions of land use, emergency response, food balances, inputs, agri-environmental indicators, food security, population, and forestry. It covers all MENA countries and the data can be linked to WaterWorld.

- **USDA FAS** | http://www.usda.gov/wps/portal/usda/usdahome?navid=DATA_STATISTICS

The Foreign Agricultural Service (FAS) of the US Department of Agriculture (USDA) “maintains a global agricultural market intelligence and commodity reporting service to provide U.S. farmers and traders with information on world agricultural production and trade for use in adjusting to changes in world demand for U.S. agricultural products. Reporting includes data on foreign government policies, analysis of supply and demand conditions, commercial trade relationships, and market opportunities. In addition to survey data, crop condition assessment relies heavily on computer-aided analyses of satellite, meteorological, agricultural, and related data.” It also provides a useful time series dating back to the 1960s.

- **AquaStat** | <http://www.fao.org/nr/water/aquastat/main>

AquaStat is an agricultural water database by FAO. It offers “data, metadata, reports, country profiles, river basin profiles, regional analyses, maps, tables, spatial data, guidelines, and other tools on: (1) water resources: internal, transboundary, total; (2) water uses: by sector, by source, wastewater; (3) irrigation: location, area, typology, technology, crops; (4) dams: location, height, capacity, surface area; (5) water-related institutions, policies and legislation.”³

- **WaterStat** | <http://waterfootprint.org/en/resources/water-footprint-statistics>

WaterStat has been developed by the Water Footprint Network of researchers at the University of Delft in the Netherlands. It currently includes five datasets: (1) product water footprint statistics; (2) national water footprint statistics; (3) international virtual water flow statistics (4) water scarcity statistics; (5) water pollution level statistics.

- **Inventory of Shared Water Resources in Western Asia** | <https://waterinventory.org>

The geographical coverage of the groundwater inventory was first determined by the membership of the United Nations Economic and Social Commission for Western Asia (UN-ESCWA), “which includes all Arab countries in Western Asia as well as some Arab countries situated in North Africa.” The “focus was placed exclusively on shared surface and groundwater resources included in the Western Asia geographic sub-region covered by ESCWA, given that there exists no comprehensive study of shared drainage basins and aquifer systems in this sub-region and there was a clear mandate to examine water resources management within a regional, transboundary context. Surface and groundwater resources located on the African continent were excluded from the Inventory” (UN-ESCWA and BGR 2013:17). These resources are covered extensively in other studies and are better addressed in an intra-African context, particularly when examining shared water systems (Thuo 2013, Zeitoun et al. 2010).

3 See the AQUASTAT website: *About AQUASTAT*, http://www.fao.org/nr/water/aquastat/About_us.

The study area excludes a number of shared basins in the northern part of Western Asia situated outside of the ESCWA region, but these are to a large extent covered in a similar initiative undertaken by the United Nations Economic Commission for Europe (UNECE 2006).

- **Global Hunger Index** | <http://ghi.ifpri.org>

The methodology of the IFPRI/International Food Policy Research Institute Global Hunger Index provides data on food availability and nourishment across the globe. “The four indicators are the percentage of the population that is undernourished, the percentage of children under five years old who suffer from wasting (low weight for height), the percentage of children under five years old who suffer from stunting (low height for age), and the percentage of children who die before the age of five (child mortality).”⁴

Yet the three equally weighted categories of the GHI – percentage of the undernourished among the general population and prevalence of underweight and mortality among children younger than five – indicate calorie shortages. They do not capture lack of micronutrients like iron or vitamins as well as the prevalence of stunting does, which also indicates other important aspects like clean drinking water and access to health care. The IFPRI report *Beyond the Arab Awakening* of 2012 (Breisinger et al. 2012) uses stunting as an indicator for food security on the micro-level and here the situation is less sanguine (Woertz 2013).

“Second, each of the four component indicators is given a standardized score based on thresholds set slightly above the highest country-level values observed worldwide for that indicator between 1988 and 2013. For example, the highest value for undernourishment estimated in this period is 76.5 percent, so the threshold for standardization was set a bit higher, at 80 percent. In a given year, if a country has an undernourishment prevalence of 40 percent, its standardized undernourishment score for that year is 50. In other words, that country is approximately halfway between having no undernourishment and reaching the maximum observed levels. Third, the standardized scores are aggregated to calculate the GHI score for each country. Undernourishment and child mortality each contribute one-third of the GHI score, while the child undernutrition indicators – child wasting and child stunting – each contribute one-sixth of the score. This calculation results in GHI scores on a 100-point scale where 0 is the best score (no hunger) and 100 the worst. In practice, neither of these extremes is reached. A value of 100 would signify that a country’s undernourishment, child wasting, child stunting, and child mortality levels each exactly meet the thresholds set slightly above the highest levels observed worldwide in recent decades. A value of zero would mean that a country had no undernourished people in the population, no children younger than five who were wasted or stunted, and no children who died before their fifth birthday.”⁵

- Data from **WaterWorld** required | <http://www.policysupport.org/waterworld>

WaterWorld is best equipped to provide data on historical land use change and run-off. Moreover, it can provide climate data to (probably) underline the human impact on the environment in the MENA countries. In reverse, WaterWorld will be updated with GLASOD (Global Assessment of Human-Induced Soil Degradation) and urbanization trends. It would be nice to have data on

4 See the official website: *Methodology*, <http://ghi.ifpri.org/methodology>.

5 Ibid.

irrigation expansion, which may be available through satellite images. Finally, groundwater data from AquaStat should be added to WaterWorld to provide a succinct picture of ground and surface water availability and historical trends. The MENARA tool will mostly rely on existing data in the WaterWorld database. However, additional data from AquaStat and IFPRI will be used where necessary. In general terms, environmental data is the existing strength of the MENARA tool, thus a wide range of datasets can be used to illustrate and analyse environmental material factors.

2.2 KEY DRIVERS FOR THE MENA REGION (1960-PRESENT): POPULATION GROWTH, CLIMATE CHANGE, WATER SCARCITY, SOIL DEGRADATION AND FOOD AVAILABILITY

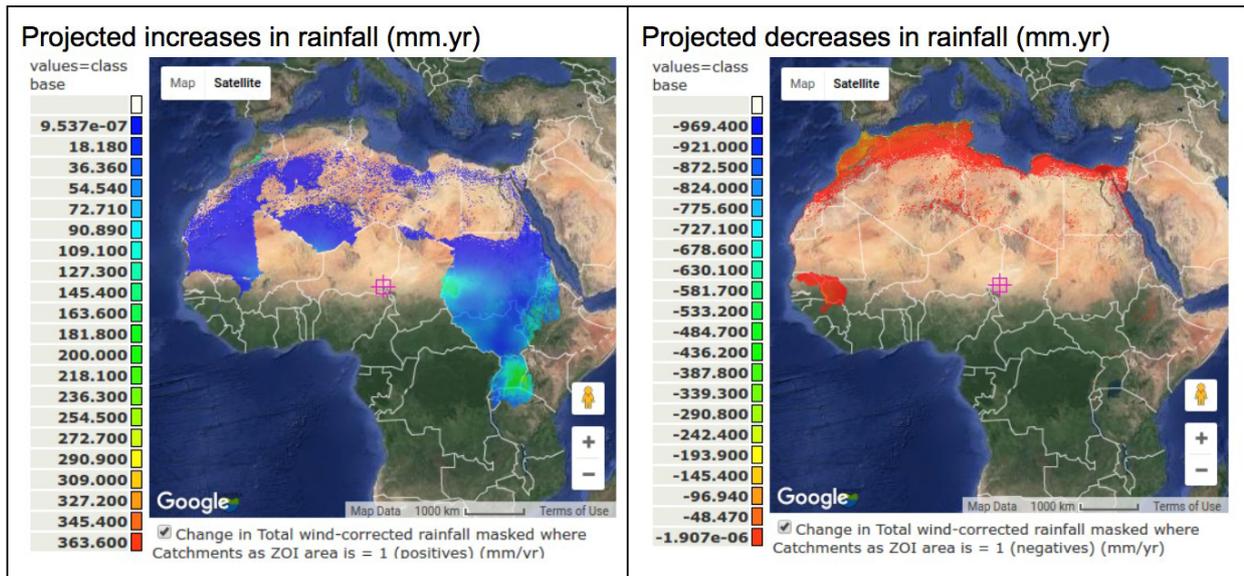
Available historical environmental data is scarce. The only database which provides historical data on water resources is Aquastat. Yet the most useful and comprehensive data is available on water resources availability (ground and surface water, water through infrastructure) and water per capita. This data has been collected since 1960, and WP3 intends to use those indicators. Data on irrigation expansion is scattered and unreliable, while data on crop yields is generally not available. Data on land use change is available via FAOSTAT. For the MENA region, land use change means in particular urbanization. However, urbanization trends have not been mapped by any database. Only raw data is available, which could be mapped by WaterWorld.

An important material environmental factor in MENA countries is soil degradation. The degree of soil degradation and the degree of soil erosion is available from GLASOD, which was launched in 1991 (Oldeman et al. 1991). On water, the general trend is declining water availability per capita due to population growth. While most of the MENA countries were abundantly endowed with water resources in the 1960s and 1970s (with the exception of the GCC countries, Palestine and Libya), availability has sharply declined since the 1980s. Other environmental data shows a very alarming current picture. Historical data is mostly non-existent, hence the analysis should focus on current trends and some future indications of how climate change, for example, may worsen environmental factors in the MENA region.

Climate change is a threat multiplier that can increase or decrease the threats posed by water and food shortages and by land degradation. Climate change is sure to have an impact in a region so defined by climatic extremes (Sowers et al. 2011). Even small changes in rainfall and temperature can make a difference to regions that are already extremely hot and dry. These differences can be positive and negative. For example, rising sea levels may put the Nile Delta in Egypt at risk of flooding (Sowers et al. 2011:608). Whilst climate change will increase temperatures globally, changes in rainfall patterns are much more complex and uncertain and some regions may become more dry whilst other regions become more wet. This may also change over time, such that increased dryness is followed by increased wetness or vice versa. The key effects of climate change will be to undermine business as usual and to force agriculture, infrastructure and populations to adjust to new and newly changing conditions. No two projections agree on how rainfall will change, so we will need to consider not adaptation to a particular future but adaptability and resilience to any reasonable future (Mulligan 2015). The figures below from the WaterWorld Policy Support System indicate projected increases in rainfall for much of the African MENARA hydrological region, particularly the mid to upper Nile, with decreases in rainfall expected for the North African coast. Combined with increases in temperature (and thus evaporation), these will lead to increases in

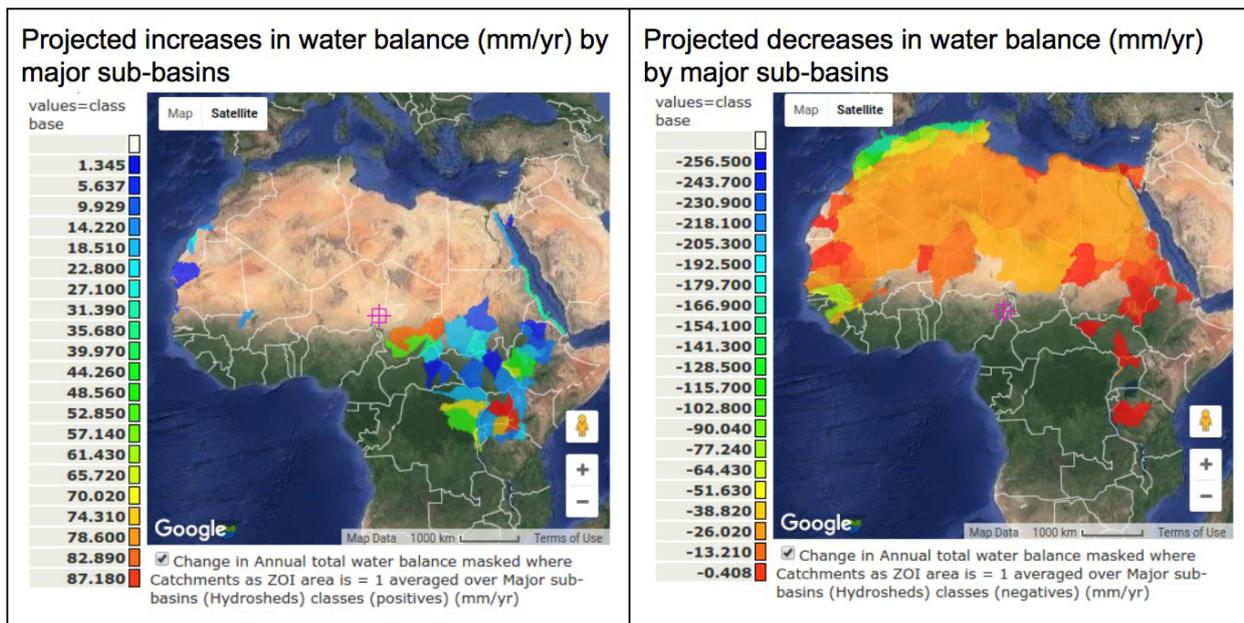
available water for the southern hydrological region but decreases for the northern hydrological region. Further work is required to understand to what extent these changes balance out over basins and to what extent annual changes are evenly spread or highly seasonal, all of which have important hydrological implications.

Figure 2 | CMIP5 rcp45 Ensemble mean (2040s) for MENARA Africa region (river basins) mean annual rainfall



Source: WaterWorld 2016.

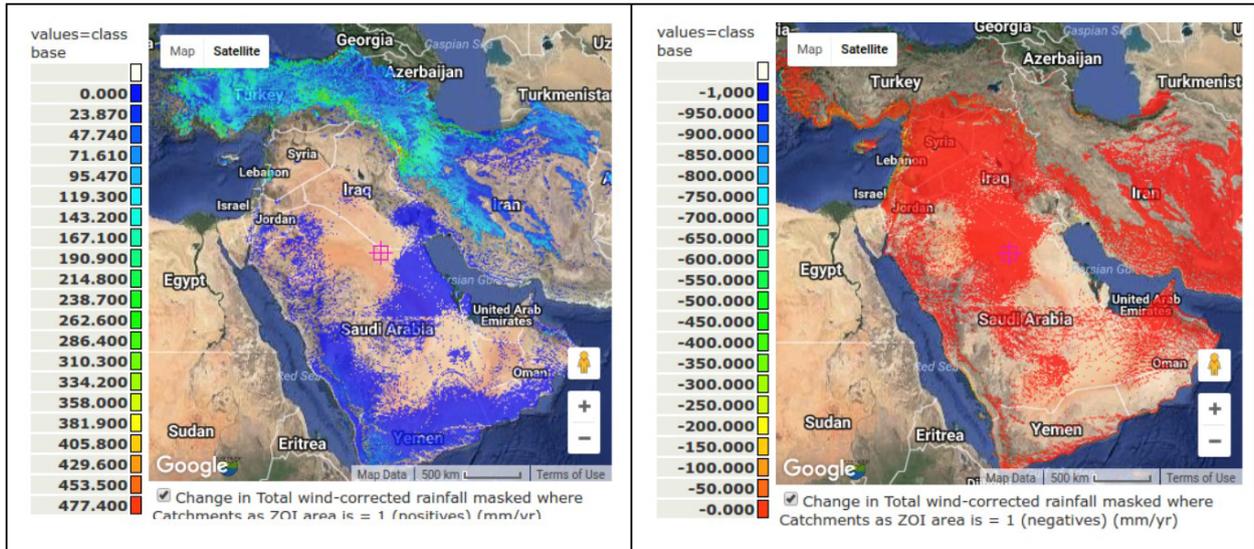
Figure 3 | CMIP5 rcp45 Ensemble mean (2040s) for MENARA Africa region (river basins) annual water balance



Source: WaterWorld 2016.

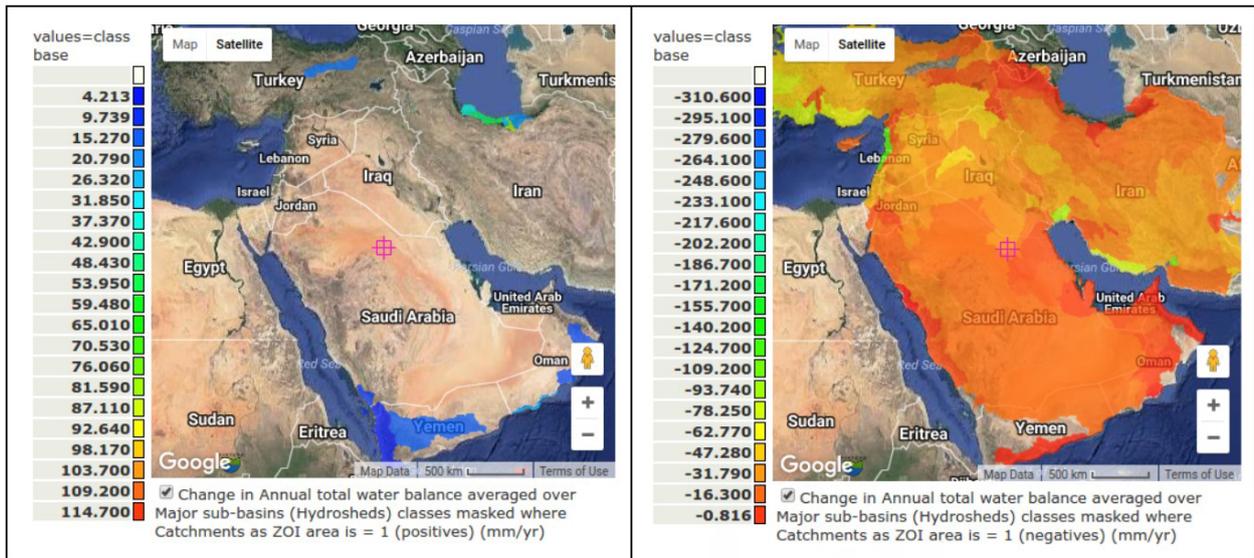
The figures below from the WaterWorld Policy Support System indicate projected increases in rainfall for much of the Asian MENARA hydrological region, particularly in the North (Turkey), with decreases in rainfall expected elsewhere, especially in the East.

Figure 4 | CMIP5 rcp45 Ensemble mean (2040s) for MENARA Asia region (river basins) mean annual rainfall



Source: WaterWorld 2016.

Figure 5 | CMIP5 rcp45 Ensemble mean (2040s) for MENARA Asia region (river basins) mean annual water balance

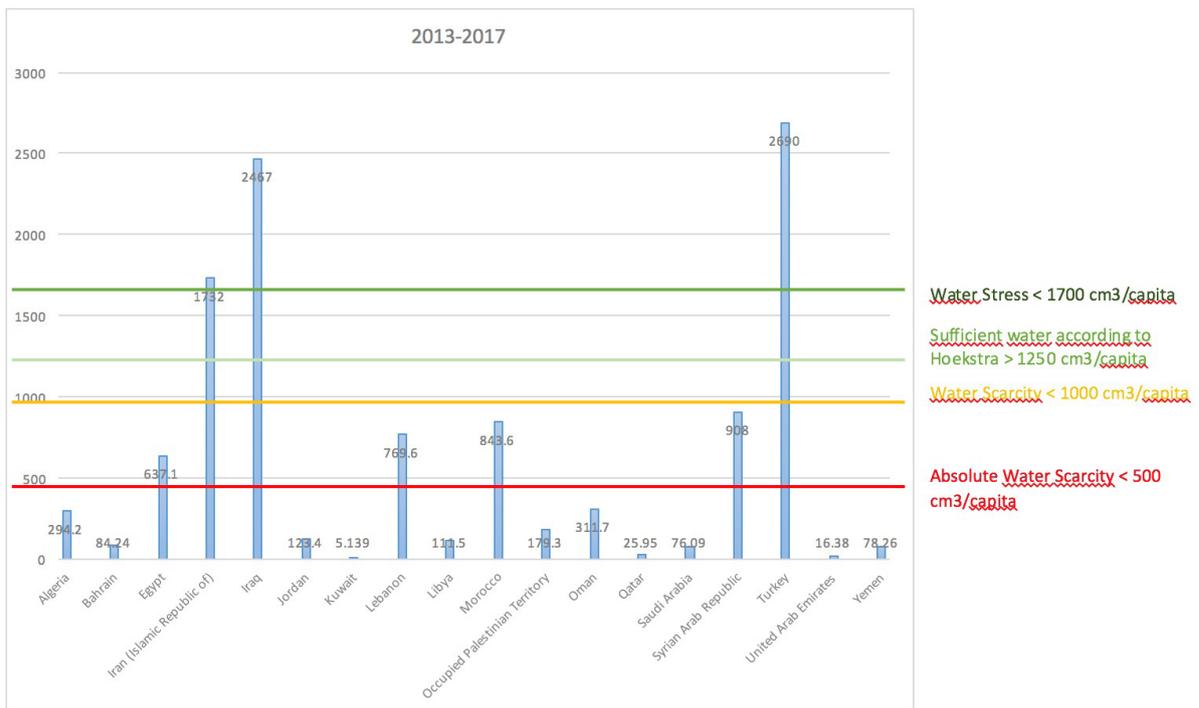


Source: WaterWorld 2016.

Data on water per capita shows that 15 out of 18 MENA countries are experiencing water scarcity. Eight countries are even facing absolute water scarcity below 500 cm³/capita. The most water-abundant countries are Iraq, Iran and Turkey. Moreover, Egypt's share of the Nile may further

decline due to dam construction in East Africa, which means its water per capita availability may drop further during the timeline of the MENARA project.

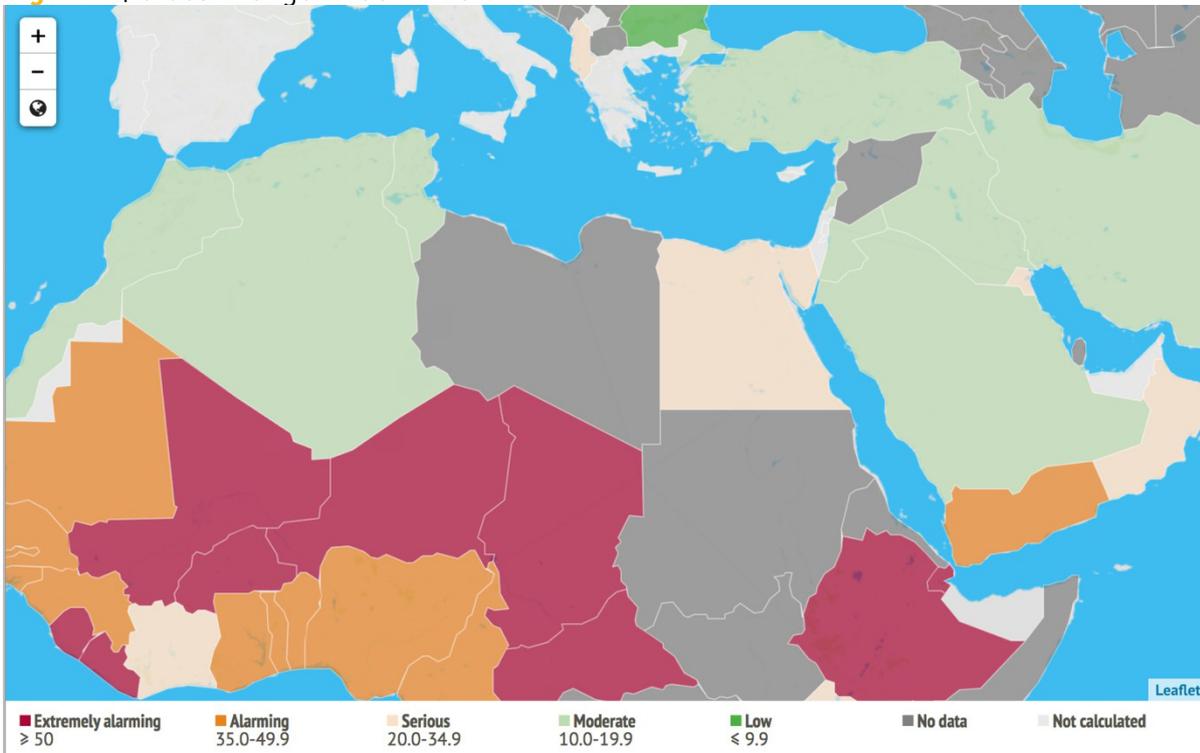
Figure 6 | Water availability per capita, MENA countries



Source: FAO AquaStat 2016.

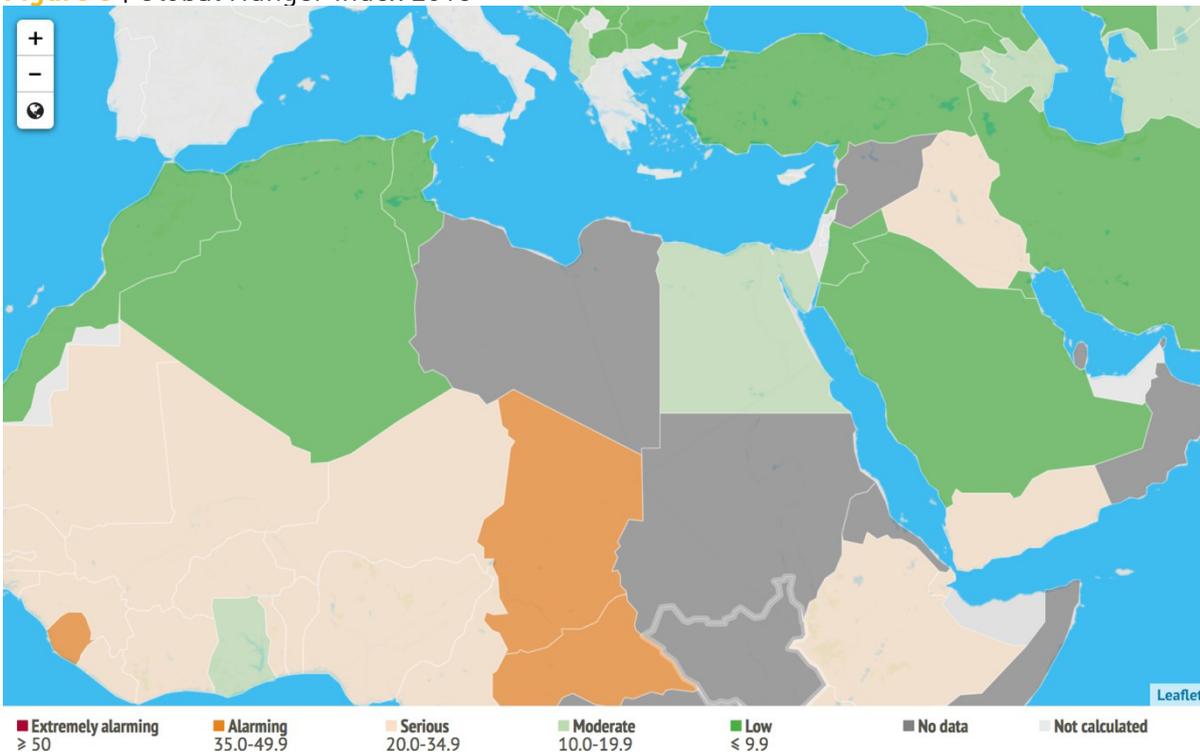
Despite increasing water scarcity in the MENA region, the Global Hunger Index shows that food availability and nourishment levels have actually increased in all MENA countries. Only Iraq has seen a decrease in food security levels, mostly due to political issues like the multilateral UN embargo that lasted from 1990-2003. Yemen is considered seriously food insecure but has improved from alarmingly food insecure. Egypt, on the other hand, is exposed to moderate food insecurity.

Figure 7 | Global Hunger Index 1990



Source: IFPRI 2016.

Figure 8 | Global Hunger Index 2015



Source: IFPRI 2016.

The most important driver of environmental degradation in the MENA countries is population growth and subsequent migration to urban areas. Economic growth in the GCC countries has attracted millions of people from within the region and beyond, which places further constraints on limited natural resources in the hyper-arid areas of the MENA member states. Prime agricultural land has been used for urban development in places such as Jordan, Lebanon, Tunisia, Syria, Egypt, Morocco, Iraq, Iran and Algeria. Due to protectionist policies aimed at food self-sufficiency, the majority of the MENA countries are over-exploiting their environment. Moreover, conflict in Syria, Yemen and Iraq has displaced millions of people, putting environmental constraints on certain hotspots such as Jordan, Lebanon, Turkey and Egypt.

3. ENERGY FACTORS

The MENA countries account for slightly more than 6 percent of the world's total population (almost 500 million inhabitants), and about 8 percent of the global total primary energy supply (1059 Mtoe in 2014). Overall, these 20 countries can be classified in two main categories: net energy importers and net energy exporters. All South and East Mediterranean countries, with the exception of Algeria and Libya, are net energy importers. In particular, the dependence rate on foreign resources is more than 90 percent in Jordan, Lebanon and Morocco. Conversely, all GCC countries, Iran and Iraq, as well as the aforementioned Algeria and Libya, are energy-exporting countries. Algeria, Libya, Iran, Iraq, Kuwait, Saudi Arabia, Qatar and UAE are all members of the Organization of the Petroleum Exporting Countries (OPEC).

Accounting for around 60 percent (more than 620 Mtoe) of total energy production in the region, Saudi Arabia heads the region as the leading energy-exporting country, with more than 400 Mtoe (65 percent of domestic energy production) in 2014.⁶ Relatively speaking, Qatar and Kuwait export around 80 percent of their domestic energy production, and Iraq almost 70 percent. However, such trends are expected to change drastically in the near future, if energy consumption continues at the present rate. For instance, in GCC countries rising energy demand (Ferroukhi et al. 2013:99), driven by huge development projects in the domestic, service and infrastructure sectors (Qader 2009), as well as growth in industrial consumption, mainly steel, aluminium, and petrochemical industries (Hart 2010), is expected to put pressure on government budgets and reduce hydrocarbon export potential, thereby resulting in a loss of foreign- exchange revenues (Ebinger et al. 2011). In this respect, the UAE and Kuwait have already become net importers of natural gas, and other GCC countries (e.g., Oman) have seen their gas exports constrained by rapidly increasing domestic energy demand. In order to meet growing natural gas needs, Bahrain plans to increase imports of natural gas. Saudi Arabia is also expected to become a net energy importer in the near future, if current consumption patterns continue (Al-Shalabi et al. 2014:219).

The energy mix in the MENA countries is heavily dependent on fossil fuels, particularly oil and natural gas, with some minor share of coal, whose production is concentrated in Turkey. This is true for the energy exporting countries, with very low penetration of renewable energy sources, which are mostly developed in energy-importing countries. Historically, hydropower, even though

6 IEA Energy Balances.

its contribution has remained constant over the years, has been the most dominant source in the countries where renewable electricity capacities exist. Other renewable energy sources, mainly wind and solar, have experienced significant progress, reaching more than 21 Mtoe in 2014, in South and East Mediterranean countries. In terms of the share in the electricity production, Turkey leads the region with a 21 percent share (Turkey alone accounts for more than half of the electricity production from renewable energy sources), followed by Syria (17 percent), Morocco (14 percent), and then Egypt (8 percent), Palestine (8 percent) and Tunisia (7 percent) while the rest of the countries have shares ranging from 0 to 5 percent.⁷

All MENA countries are particularly well suited for the development of a basket of renewable energy technologies for different applications. As far as solar energy technologies are concerned, most of the countries lie in the so-called Sunbelt, with global horizontal irradiance (GHI) values ranging from 1,600 kWh/m²/y in coastal areas of the Mediterranean to 2,600 kWh/m²/y in the desert, and direct normal irradiance (DNI) varying from 1,800 kWh/m²/y to more than 2,800 kWh/m²/y. This is one of the best endowed areas of the world with respect to solar energy, both for photovoltaic (PV) and concentrated solar power (CSP) applications (Al-Shalabi et al. 2014:190). The potential for wind is also very high in several countries of the Mediterranean like Morocco, Egypt and Turkey, as well as Iran, with more moderate – but still interesting – potential in GCC countries and Iraq.

In a 2011 information paper (Müller et al. 2011), the long-term potential of several renewable energy technologies in selected MENA countries was analysed. The study results showed higher potential for renewable energy (RE) technologies, especially for both solar PV and solar CSP technologies, particularly in Saudi Arabia.

Additionally, Al Masah Capital (2011) highlights that there are very favourable framework conditions in the MENA region (RE) for solar technologies, both for CSP and PV applications. Desertec (2012:12) uses a market simulation model to depict a scenario where renewables can cover 90 percent of the electricity mix. In this context, solar CSP contributes 16 percent to the mix and is mostly concentrated in the MENA region, while solar PV contributes 9 percent and is distributed across Southern Europe and the MENA.

Despite the promising potential, current development of renewable energy technologies (RETs) is still quite low. As highlighted by MESIA (2015), in 2013 there were more solar power plants built in Slovenia than in all the countries of the Middle East combined. From 2006-2013, only 70 MW of solar PV projects were awarded across the region, against an installed capacity of 139 GW at global level (MESIA 2015, REN21 2014). However, the outlook for renewables seems promising, thanks to a rapidly evolving regulatory framework, that is more favourable to renewable energy investments. Almost all countries have established ambitious objectives and plans for development and deployment of renewable energy, either in the energy mix or in electricity production. In particular, government-backed tenders have resulted in some of the most cost-effective projects at world level for solar and wind, with record low prices in Morocco and the UAE.

⁷ OME database.

Turkey, Egypt, Morocco and Tunisia lead so far the wind energy market in the region with cumulative installed capacity of 4 GW, 610 MW, 787 MW and 245 MW, respectively. However, plans are ongoing in almost all countries in the MENA region, although with different implementation speeds. As for solar PV, as reported by MESIA (2015), in 2014 a record number of solar projects were awarded in the Middle East with a combined capacity of 294 MW. Most of this capacity (212 MW) is related to the 12 ground-mounted solar projects in Jordan, as part of the first round of independent power producer (IPP) tenders. Strong growth is observed in Israel, which is by far the leading country for solar PV across the region. However, plans are ongoing in several other countries, including Egypt, Kuwait, Dubai and Turkey.

Solar CSP is a promising option in Morocco, Saudi Arabia and the UAE. CSP capacity in the region includes 100 MW in the UAE, 25 MW in Algeria, 180 MW in Morocco and 20 MW in Egypt (REN21 2016:146). According to REN21 (2016), the MENA region remains a hub for CSP activities. In Israel, the Ashlim plant (121 MW) is expected to come online in 2017, as is a 10 MW hybrid CSP biomass plant with thermal storage. In Kuwait, preferred bidders were selected for the Shagaya CSP plant (50 MW), while expressions of interest were invited for the hybrid Al Abdaliyah ISCC plant, with a 60 MW solar field. Morocco is the most advanced in the implementation of CSP projects. The country aims at developing 5 GW of solar capacity by 2030 (both solar PV and CSP) within the framework of its Solar Programme. Current CSP capacity in the country is 180 MW: 20 MW at Ain Beni Mathar and 160 MW at NOOR I in Ouarzazate. The second phase is under construction at NOOR II and III, with a total capacity of 350 MW, foreseen to be commissioned by the end of 2017 and early 2018, respectively. Finally, NOOR Midelt and NOOR Tata will have an installed capacity of 500 MW each. Also, a parabolic through CSP pilot plant of 3 MW was developed by Cimarron, Italcementi Group at Ait Baha, in the Agadir region; production started in the second quarter of 2014. The growth of renewables is being pushed by a drastic decline in the cost of technologies, particularly for onshore wind and solar PV. However, several barriers hold back the potential of renewables in the MENA countries, including weak grid infrastructure, regulatory barriers, access to finance and, most important, subsidies to conventional energy. Almost all countries provide some kind of energy subsidies, which are reflected in the final consumer prices of energy products and services. The highest levels of energy subsidies are in the energy-exporting countries. In absolute terms, Iran and Saudi Arabia provided the highest subsidies with 78 billion and 71 billion dollars, respectively, in 2014, according to IEA estimates.⁸ Overall, more than 250 billion dollars was spent by the MENA countries reviewed for subsidies to fossil fuels in 2014. Of this amount, almost 60 percent went to oil, with the rest split equally between natural gas and electricity.

Having realized the opportunity cost of saving fossil fuels and directing a part of them to export (especially for GCC countries) and lessening the burden on public state budgets (especially for countries like Morocco and Jordan), several countries have recently undertaken some reforms and are gradually phasing out subsidies on some fossil fuels. For example, in 2015 Oman raised gas prices for industrial consumers, the UAE started gradually adjusting monthly prices to the global average and Iran increased the price of gasoline. Similar reforms have been instituted in Egypt, Tunisia and other South and East Mediterranean countries.

⁸ IEA fossil-fuel subsidies (real 2013 billion dollars).

Table 1 | Main energy indicators for the countries covered by MENARA

Country	Population (million)	Energy production (Mtoe)	Net imports (Mtoe)	Total primary energy supply (Mtoe)	Electricity production (TWh)	Share of RES in electricity production (%)	CO2 emissions (Mt)
Energy exporting countries							
Saudi Arabia	30,89	622,42	-405,45	213,51	312,00	0	506,59
Qatar	2,17	219,93	-173,81	44,08	38,70	0	77,61
Kuwait	3,75	166,36	-131,14	33,88	65,14	0	86,08
Iraq	34,81	162,99	-111,28	49,48	67,80	4	141,03
UAE	9,09	200,04	-109,55	70,47	110,00	0	175,43
Algeria	39,92	143,46	-83,02	60,44	59,29	1	137,49
Iran	78,14	316,25	-75,32	237,08	275,00	5	556,09
Oman	4,24	74,49	-48,54	24,33	29,12	0	59,90
Libya	6,27	51,39	-35,67	15,72	27,33	0	38,23
Yemen	26,18	16,05	-8,63	7,42	7,65	0	21,34
Bahrain	1,36	22,88	-8,36	14,16	27,20	0	29,69
Energy importing countries							
Palestine	4,44	0,42	1,43	1,85	0,12	8	2,54
Tunisia	10,98	6,87	2,97	9,84	17,07	7	23,16
Syria	22,70	5,99	4,02	10,01	19,45	17	23,15
Egypt	83,39	79,60	6,77	86,37	167,54	8	204,08
Lebanon	4,71	0,20	7,55	7,75	12,83	5	17,74
Jordan	6,78	0,29	8,20	8,48	19,11	1	22,70
Israel	8,12	7,65	15,99	23,63	65,97	2	68,21
Morocco	33,45	1,83	17,65	19,47	27,75	14	52,95
Turkey	76,78	32,66	88,68	121,34	251,96	21	317,96

Source: OME and IEA 2015.

Table 2 | Major publications on energy trends, including MENA countries

Publication	Time horizon	Energy sources covered	Countries covered			
			South Med.	South-East Med.	GCC	Rest of World
OME Mediterranean Energy Perspectives	1970-2040	All	X	X	n/a	n/a
IEA World Economic Outlook	1970-2040	All	X	X	X	X
IRENA Renewable Energy Statistics	2006-present	Renewables (mainly for power sector)	X	X	X	X
BP Statistical Review of World Energy	1950-present	All	Selected major producing and consuming countries by energy source (other countries are aggregated)			
OPEC Annual Statistical Bulletin	1965-present	Oil and gas	OPEC countries (of which MENA countries are: Algeria, Iran, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and the UAE)			

Source: OME 2016.

In addition to the regular publications, energy issues in the MENA countries have been covered by many institutions and journals. Several other institutions have been publishing articles on energy issues, including the Oxford Institute for Energy Studies, Bloomberg, IRENA, the World Bank, Gulf Research Center, Wuppertal Institute, Chatham House, King Abdullah Petroleum Studies and Research Center, Economist Intelligence Unit, International Monetary Fund (IMF), RCREEE, MESIA, etc.

3.1 KEY DATASETS

- **OME** | <http://www.ome.org/database>

The OME database is perhaps the most reliable dataset available for some MENA countries. However, it is currently under construction and it covers only the Mediterranean region (North Africa, West Asia including Jordan and Turkey). It therefore excludes the MENA countries in the Gulf and Iran.

- **RCREEE** | <http://www.rcreee.org>

The Regional Center for Renewable Energy and Energy Efficiency (RCREEE) is an intergovernmental organization based in Cairo with diplomatic status that aims to enable and increase the adoption of renewable energy and energy efficiency practices in the Arab region. RCREEE has established a database which covers the countries of the League of Arab States, so again partly matching with the MENA coverage. Also, the focus is on renewable energy and energy efficiency.

- **IRENA** | <http://resourceirena.irena.org/gateway/dashboard>

The International Renewable Energy Agency (IRENA) based in Abu Dhabi has a global approach but is limited to renewable energy only; it does not cover conventional energy.

- **IEA** | <http://www.iea.org/statistics>

The International Energy Agency (IEA) is the reference for all energy studies and prospects. It may be the most comprehensive dataset. Although the quality of the dataset for non-OECD countries is less reliable, in terms of geographical and technological coverage, it is definitively the most complete dataset for the MENA countries.

- **OPEC** | http://www.opec.org/opec_web/en/about_us/155.htm

The Organization of the Petroleum Exporting Countries (OPEC) based in Vienna provides data on oil prices and reserves. It is the most comprehensive dataset available on oil, which will be pertinent to the oil-producing countries in the MENA region.

- **BP Statistical Review of World Energy** | <http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>

BP maintains a dataset on energy (fossil and renewable) economics (consumption, production, energy capacity) covering the larger MENA countries. However, it does not compile data for the smaller MENA countries, hence it provides at best an added value to the other datasets.

- **World Bank Energy & Mining** | <http://data.worldbank.org/topic/energy-and-mining>

The World Bank's database allows users to access data such as access to energy, energy imports

and energy use for all MENA countries.

- **EIA Weekly Petroleum Status Report** | <http://www.eia.gov/petroleum/supply/weekly>

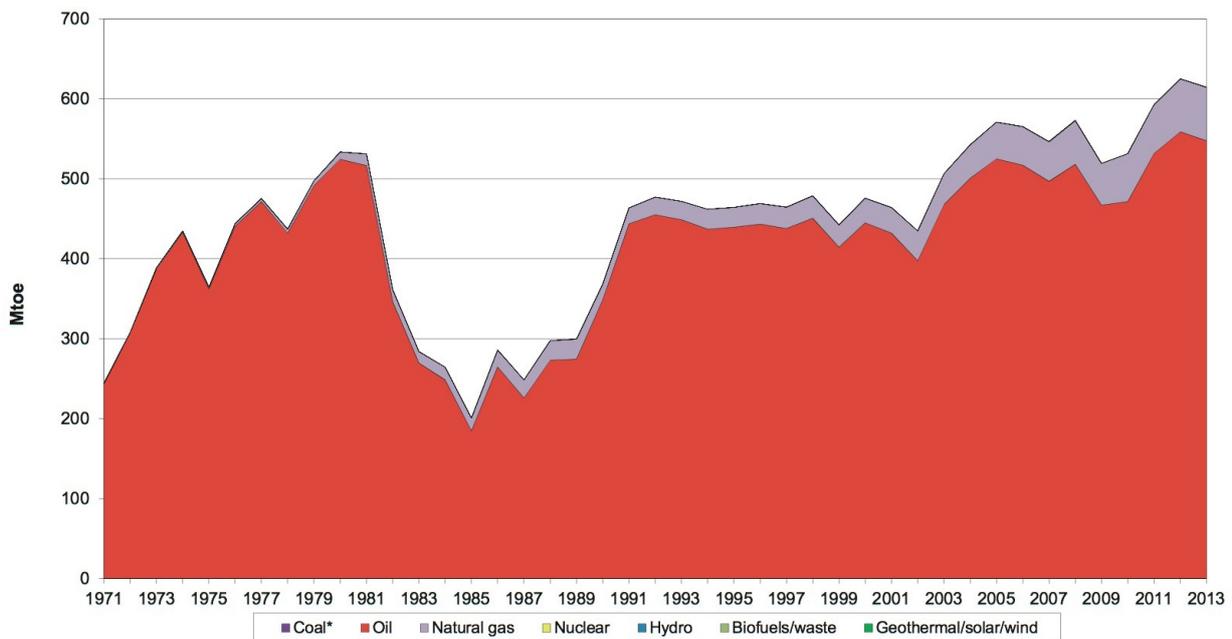
The US Energy Information Administration (EIA) provides weekly petroleum reports, which may or may not be of use for the MENARA project. It is still regarded as one of the key data providers on hydrocarbons in the world.

The MENARA tool will utilize energy data from OME in addition to OECD and IEA data, which is not covered by the OME dataset. OME, IEA and OECD use a similar methodology for energy data (see Table 2) to harmonize data use and extraction for adding it to the MENARA tool.

3.2 KEY DRIVERS FOR THE MENA REGION (1970-PRESENT): ENERGY PRODUCTION, ENERGY CONSUMPTION AND TECHNOLOGY

The MENA countries are among the most important hydrocarbon producers in the world. This especially applies to the GCC economies. Around 31 percent of global oil production takes place in the MENA countries (BP 2016:8). According to BP (2016:6), 15.7 percent of world oil reserves are in Saudi Arabia, 9.3 percent in Iran, 8.4 percent in Iraq, 6 percent in Kuwait and 5.8 percent in UAE. Some 41 percent of natural gas reserves are also in the MENA region (BP 2016:20). The lion's share is split between two economies (Qatar 13.1 percent and Iran 18.2 percent). The North African MENA countries enjoy limited gas and oil endowments, with the exception of Libya, which ranks among the top ten countries in the world in oil reserves.

Figure 9 | Saudi Arabia oil and gas production since 1971



* In this graph, peat and oil shale are aggregated with coal, when relevant.

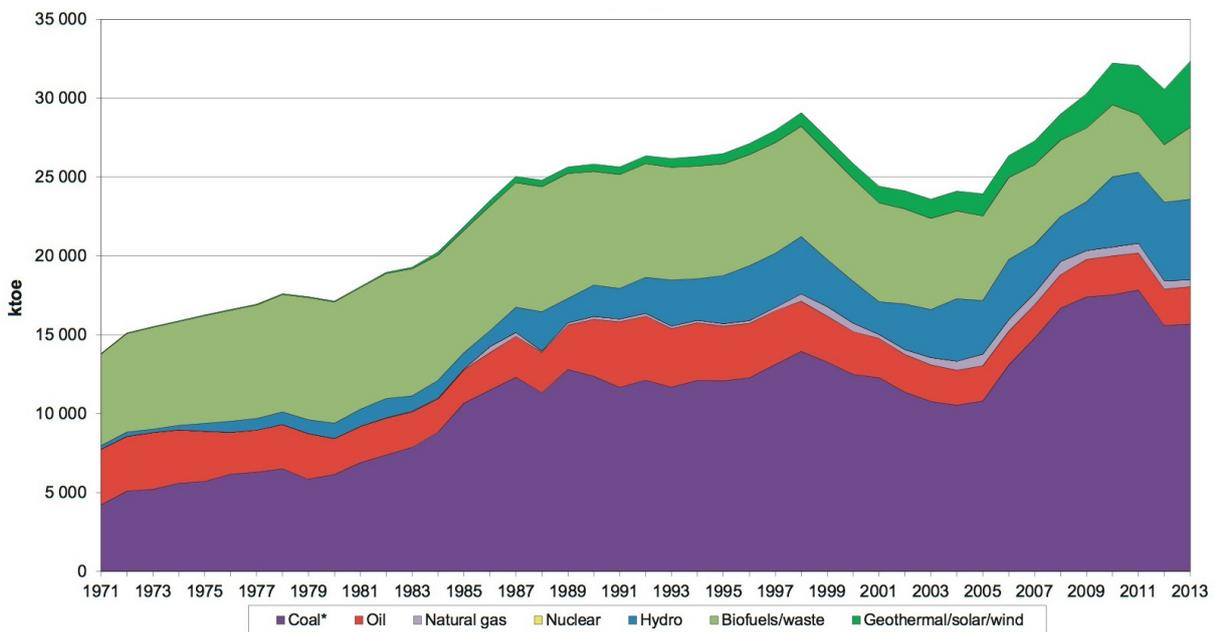
Source: IEA 2016.

The region has undergone a hydrocarbon boom since the 1970s. This boom has occurred in waves in accordance with the global oil price. For example, while the largest oil exporter of the MENA countries, Saudi Arabia, produced approximately 150 Mtoe per year in 1971, it gradually increased in the 1970s to 520 Mtoe per year followed by a steep decline to below 200 Mtoe per year in the mid-1980s. After the peak in the 1980s, oil production increased to 400-520 Mtoe in the 1990s and 2000s (Figure 9).

At the same time, the MENA countries have been prime consumers of fossil fuels to electrify their economies. Almost all MENA countries have a heavy energy focus on hydrocarbons. This especially applies to the poorer MENA countries, which have been largely dependent on oil and gas to electrify their economies. Except for the net-producing oil and gas economies (Iraq, Iran, GCC and Libya), all other MENA countries are net-importers of energy.

Only Turkey and to a lesser extent Morocco have generated a more balanced energy portfolio in terms of production. However, both economies depend on gas and oil imports from both MENA countries and outside the region.⁹ Egypt, Iran and Iraq further use hydropower due to the natural endowments of the Euphrates and Tigris and Nile basin.

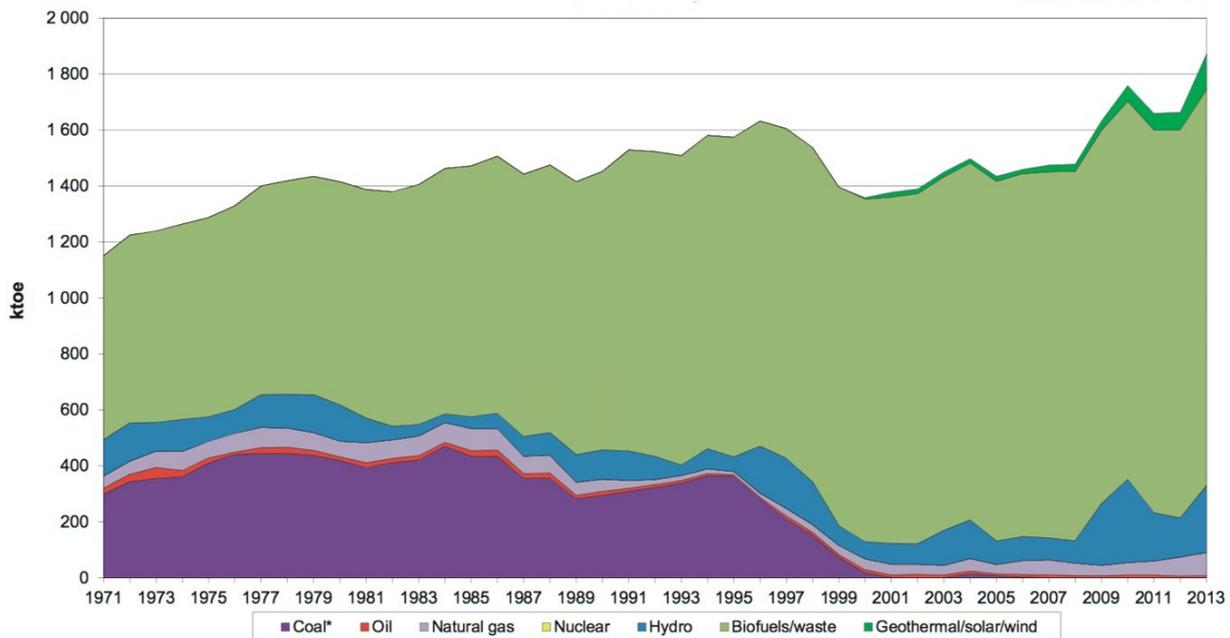
Figure 10 | Energy production Turkey



Source: IEA 2016.

⁹ Turkish Ministry of Foreign Affairs webpage: *Turkey's Energy Profile and Strategy*, <http://www.mfa.gov.tr/turkeys-energy-strategy.en.mfa>.

Figure 11 | Energy production Morocco



Source: IEA 2016.

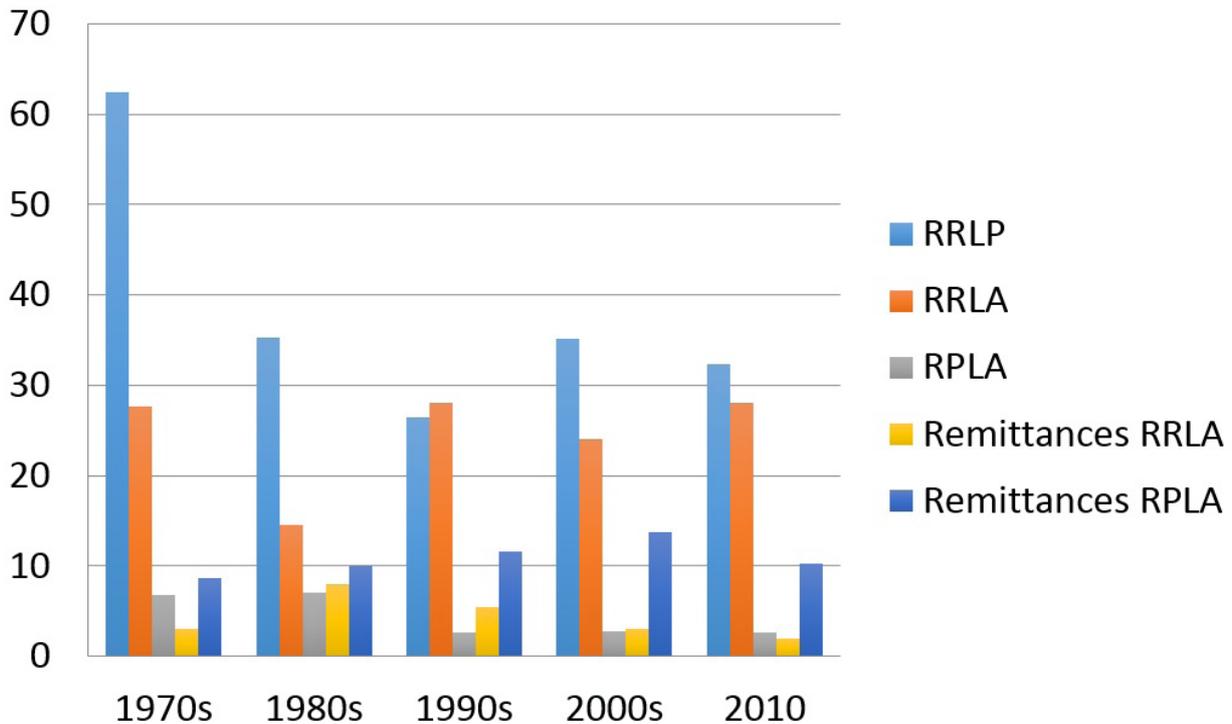
Energy trends for the MENA countries are shaped by the price of oil and gas resources. Oil prices especially experienced a boom in the 1970s and a steep decline in the 1980s. Since the 1990s, the global demand for oil has tripled (BP 2016), providing the economies in the south-eastern part of the MENA region with immense excess income. A recent trend is the production of renewable energy sources (in particular solar) to diversify the energy portfolio. However, the divestment by international finance from fossil fuels and the expansion of US energy production have led to decreasing returns for hydrocarbons, leaving the net producers vulnerable in the twenty-first century.

4. ECONOMIC FACTORS

The economic track record of MENA countries is mixed. In the 1990s growth recovered, but it has remained more volatile than in other middle income countries globally (Cammatt et al. 2015). Wealth inequality, if not income inequality, has risen in the wake of liberalization policies that have only benefited a few privileged cronies of the respective regimes (Alvaredo and Piketty 2014, Verme et al. 2014, Breisinger et al. 2011). Good economic growth in the 2000s has often gone hand in hand with increased marginalization.

MENA countries have varying degrees of dependence on oil rents, which accrue to them either directly or indirectly via remittances of migrant workers and transit fees (e.g. the Suez Canal). Depending on resource endowment and population size, three categories can be distinguished: resource rich labour poor (RRLP), resource rich labour abundant (RRLA) and resource poor labour abundant (RPLA) (see Figure 12).

Figure 12 | Oil rents and remittances in percentage of GDP



Source: Cammett et al. 2015.

Only with a move away from mere rent extraction and distribution and a turn towards more economic diversification can more inclusive growth policies succeed. Even before the global financial crisis, the schematic belief of the Washington Consensus in self-regulating markets and privatization was questioned. There is no doubt that an enabling and regulating state with “embedded autonomy” (Evans 1995) is crucial for developing countries and that the successful examples of industrialization in Asia have relied on such states (Wade 2004, Chang 2002 and 2003).

In Middle Eastern rentier states, the role of government has been less beneficial (Henry and Springborg 2010, Luciani 1987). Yet Gulf countries have managed to establish “pockets of efficiency” and well-managed state owned enterprises like SABIC (Luciani 2012, Hertog 2010). The case is not as clear-cut as the literature about the resource curse often posits (Gelb 1988, Auty 1990, Sachs and Warner 1995, Stevens 2003). However, in some countries, such as Iraq or Libya, such insulation of the oil sector from political patronage and interference has not occurred and the arguments of the resource curse are particularly pertinent. Bloated public sectors and the manifestation of Dutch disease in the form of non-competitiveness of tradeables is widespread (Galal and Selim 2012, Ali and Elbadawi 2012). Other widely covered aspects have been the anomalies of authoritarian rentierism, the disintegration of state structures since the 1980s and the descent into brutal repression by entrenched “bunker states” that have relied on sectarian group solidarity and corrupt co-optation of clientele groups to preserve their power at the expense of political rivals and civil society (Henry and Springborg 2010, Makiya 1998).

In terms of data this project will extract relevant macroeconomic data such as GDP per capita at purchasing power parity or GDP in constant prices, inflation and unemployment from the World Economic Outlook dataset of the IMF (2016). Demographic data will be taken from the World Population Prospect Series of the United Nations, periodically amended by national datasets (UNDESA 2016). Human Development Indicators will be taken from the World Bank Development Indicators and the UNDP (World Bank 2016, UNDP 2016). Economic data is perhaps the most reliable data available for the study of material factors of MENA countries. All countries report to the IMF and the World Bank, which possess key datasets of relevance for the MENA region. Historical data (prior to 1990), however, is difficult to obtain, hence the study will use data for 1990-2016.

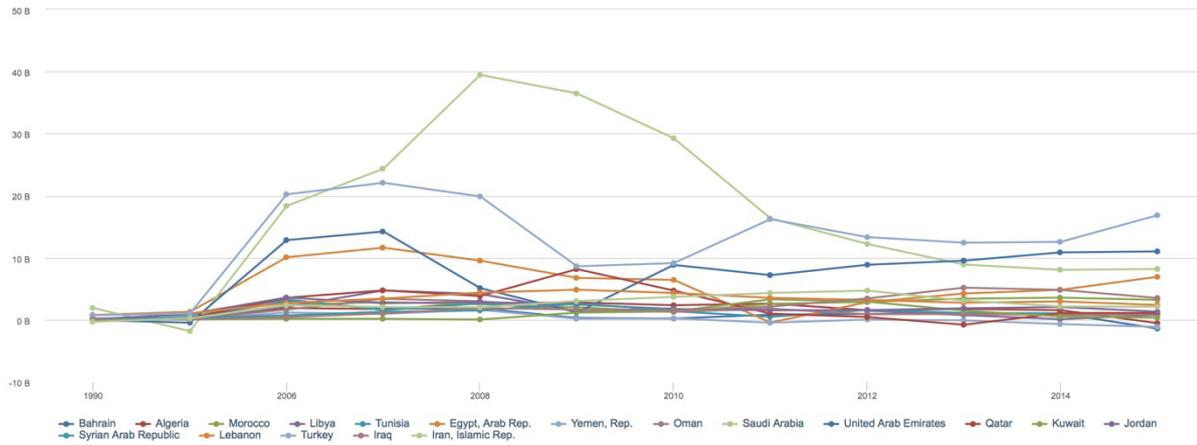
4.1 KEY DATASETS

- **IMF World Economic Outlook Database** | <http://www.imf.org/external/ns/cs.aspx?id=28>
“The World Economic Outlook (WEO) database contains selected macroeconomic data series from the statistical appendix of the World Economic Outlook report, which presents the IMF staff’s analysis and projections of economic developments at the global level, in major country groups and in many individual countries.”
- **World Bank data: Economy & Growth** | <http://data.worldbank.org/topic/economy-and-growth>
World Bank data on economic growth is designed to help policy-makers and researchers better understand different countries’ economic situations. Data “covers measures of economic growth, such as gross domestic product (GDP) and gross national income (GNI). It also includes indicators representing factors known to be relevant to economic growth, such as capital stock, employment, investment, savings, consumption, government spending, imports, and exports.”

4.2 KEY DRIVERS FOR THE MENA REGION (1990-PRESENT): GROWTH, JOB CREATION, INEQUALITIES, SUBSIDIES AND REMITTANCES

The MENA region is characterized by three types of economic development. First, there are high-income countries (in fact the highest-income countries in the world) such as Qatar, Kuwait, Saudi Arabia, Oman, Bahrain and United Arab Emirates. Second, there are mid-income countries such as Jordan, Syria, Turkey, Lebanon, Egypt, Morocco, Tunisia and Iran. Third, there are low-income countries including Yemen, Algeria, Libya and Iraq. However, economic development has been deeply affected by: (a) (geo-)political factors such as conflict and economic sanctions, for example in Iraq, Iran, Libya and Syria; (b) availability of natural resources rents in the form of hydrocarbons in the GCC economies; and (c) high inequality levels due to internal corruption. Due to a non-existent welfare state, both subsidies and remittances from abroad have played key roles in economic development in the MENA region.

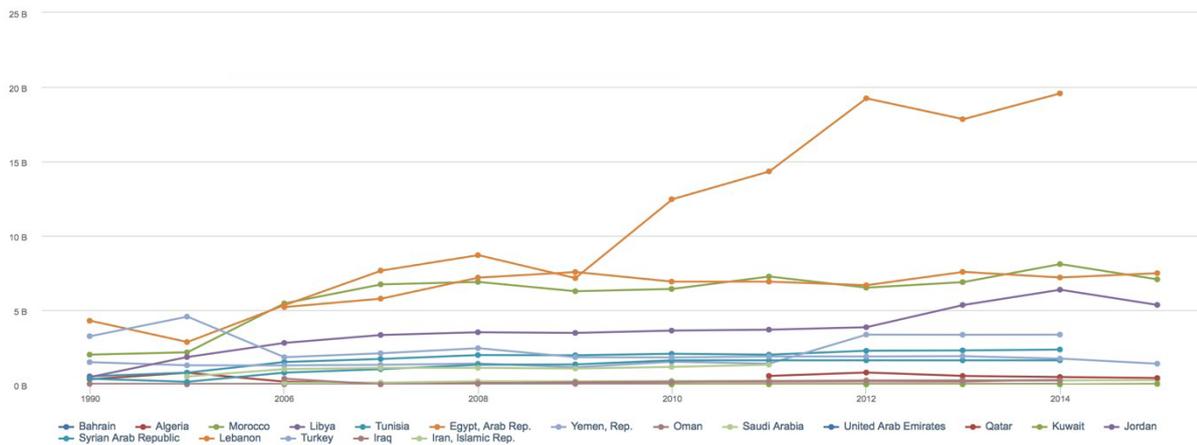
Figure 13 | FDI inflows



Series : Foreign direct investment, net inflows (BoP, current US\$)
Source : World Development Indicators
Created on: 09/22/2016

Source: World Bank 2016.

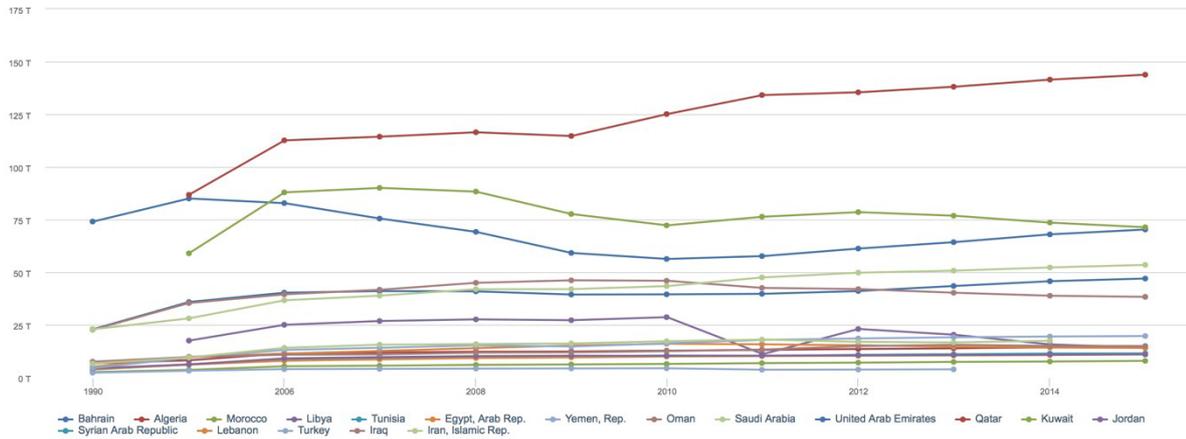
Figure 14 | Remittances received by MENA countries



Series : Personal remittances, received (current US\$)
Source : World Development Indicators
Created on: 09/22/2016

Source: World Bank 2016.

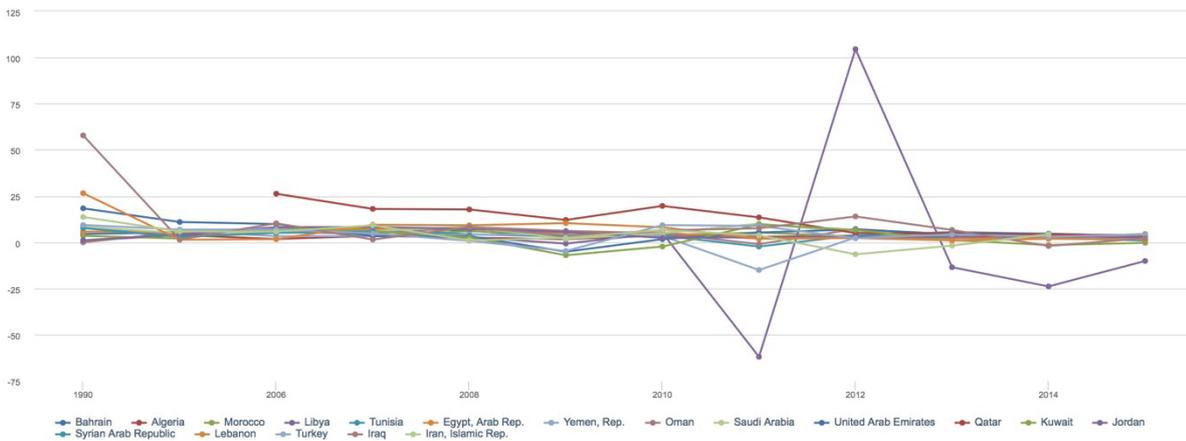
Figure 15 | GDP per capita



Series : GDP per capita, PPP (current international \$)
Source: World Development Indicators
Created on: 09/22/2016

Source: World Bank 2016.

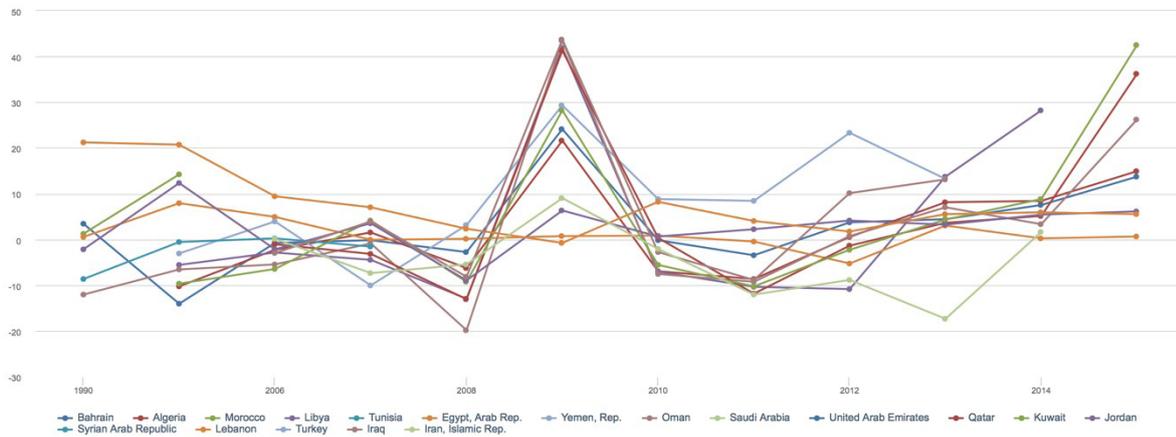
Figure 16 | GDP annual growth



Series : GDP growth (annual %)
Source: World Development Indicators
Created on: 09/22/2016

Source: World Bank 2016.

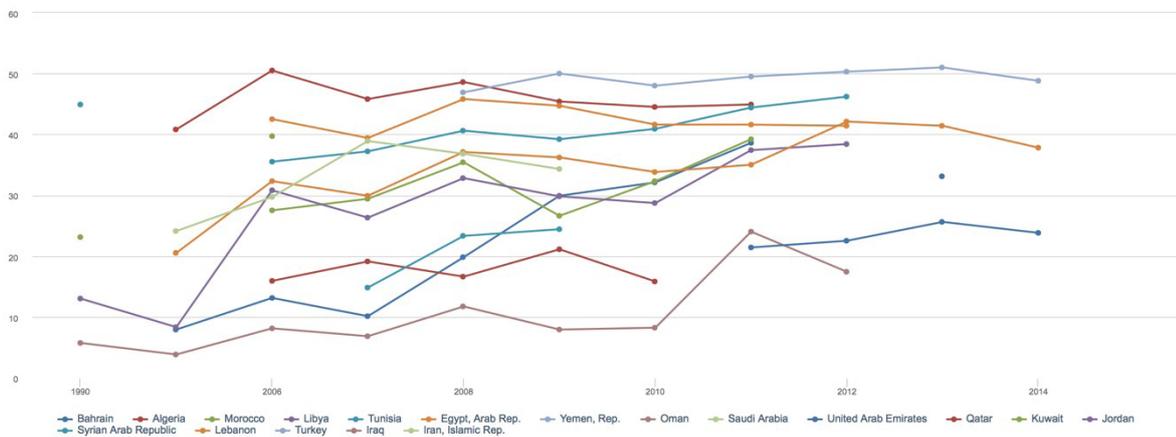
Figure 17 | Real interest rate



Series : Real interest rate (%)
Source: World Development Indicators
Created on: 09/22/2016

Source: World Bank 2016.

Figure 18 | Subsidies and other transfers in percentage of public expenses



Series : Subsidies and other transfers (% of expense)
Source: World Development Indicators
Created on: 09/22/2016

Source: World Bank 2016.

5. MILITARIZATION FACTORS

The MENA region is one of the most prolific global regions in the arms trade. While the arms trade might easily be identified as one of the main sources of information on the current state of affairs of the sector, there is no common agreement on what sort of activity represents the arms trade. The lack of clarity and disclosure by many arms suppliers and receivers makes it difficult to compile accurate data on the value and amount of their arms trade. National control lists serve as the basis for national reports on arms exports. These reports are not very detailed, but they supply data on the financial value of arms export licenses or arms exports. Various major exporters (e.g. Russia) do not produce such reports, but they do publish official data on the financial value of their arms exports (Holtom and Bromley 2010). Using national reports and official statements, the Stockholm International Peace Research Institute (SIPRI) has endeavoured to provide estimates of the financial value of the international arms market.

Governments, the UN and the EU all use different methodologies when presenting arms data. This can lead to disagreements and can make comparisons difficult (Amnesty International 2011). When using the data, we might find that categories are imprecise and that there is rarely any suggestion of the intended end-use and end-user. The problem is especially acute when focusing on the MENA region, where transfers to non-state actors are not included in the data, but they are a major aspect of the arms trade in the region (Cordesman 2016a). The arms import data does not seem to report on ballistic missile transfers and costs, or any aspect of importing technologies relating to weapons of mass destruction. Frequently, data can be inconsistent and/or incomplete. The arms industry, also known as the defence industry, is composed of manufacturing, sales of weapons and military technology and materiel. However, in order to differentiate between trade and manufacturing, hereafter “arms industry” will only refer to the industry involved in the research and development, engineering, production, and servicing of military material, equipment, and facilities. Information on the arms industry tends to be extremely opaque, and therefore it is hard to establish real numbers for the sector (Surry 2006). Moreover, no comparable reference or appraisal is accessible about the cost and effectiveness of domestic arms production.

Even though the existing literature and data pose some concerns about the accuracy and reliability of the data, there are other elements that should be taken into account for militarization trends. First, there is no disclosed and solid database regarding illegal arms traffic (Amnesty International 2011). This is not a minor issue in the MENA region, therefore it should be taken into account when working with official figures on the arms trade. Another variable that affects the data is informal military expenditure. Militias and other groups are actively participating in the market and they have a significant impact on regional economic activities. However, they are not listed in the official data due to lack of reliability and concerns about the data obtained.

The last element that should be stressed is the difference between military expenditure and security expenditure. Some MENA countries might have low military expenditure, but their costs for internal security purposes such as domestic intelligence are high.

5.1 KEY DATASETS

- **Military Balance** | <http://www.iiss.org/en/publications/military-s-balance>

The main source will be the successive editions of the annual Military Balance, published by the International Institute for Strategic Studies (IISS) in London. It provides annual data (estimates) on military capacities in all MENA countries.

- **Military Expenditure** | <http://data.worldbank.org/indicator/MS.MIL.XPND.GD.ZS>

The World Bank provides economic data on military expenditure in relation to GDP.

- **SIPRI databases** | <https://www.sipri.org/databases>

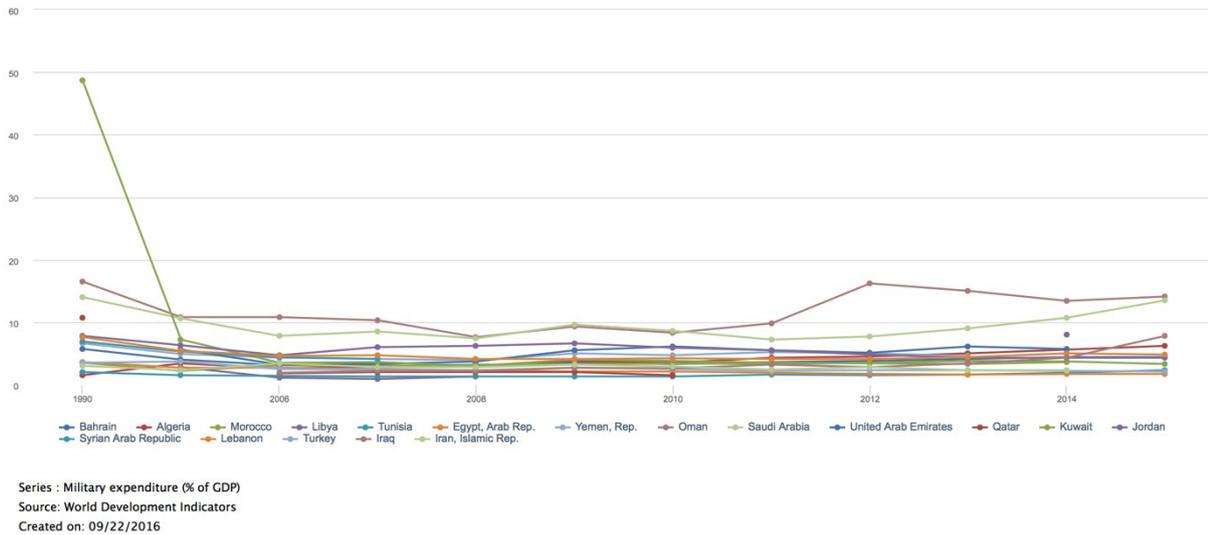
An important second source is the Stockholm International Peace Research Institute (SIPRI), which has several databases, including on the arms trade.

5.2 KEY DRIVERS FOR THE MENA REGION (1990-PRESENT): ARMS SUPPLIES, MILITARY EXPENDITURE AND CONFLICTS

Militarization in the MENA countries has occurred in waves in line with conflicts and warfare in the region. The MENA countries acquire arms from two different camps, stemming from their Cold War linkages to either North America and Europe or the Soviet Union/China/Eastern Europe. This “stickiness” has survived the Cold War era, leaving dividing lines between the two geopolitical camps. However, there are exceptions to the rule with the Netherlands supplying Iran with European arms and China supplying Saudi Arabia with Chinese warfare technology, hence the picture remains somewhat murky at times. Overall, military expenditure is still high in the MENA region owing to its geostrategic position between the Western and Eastern camps.

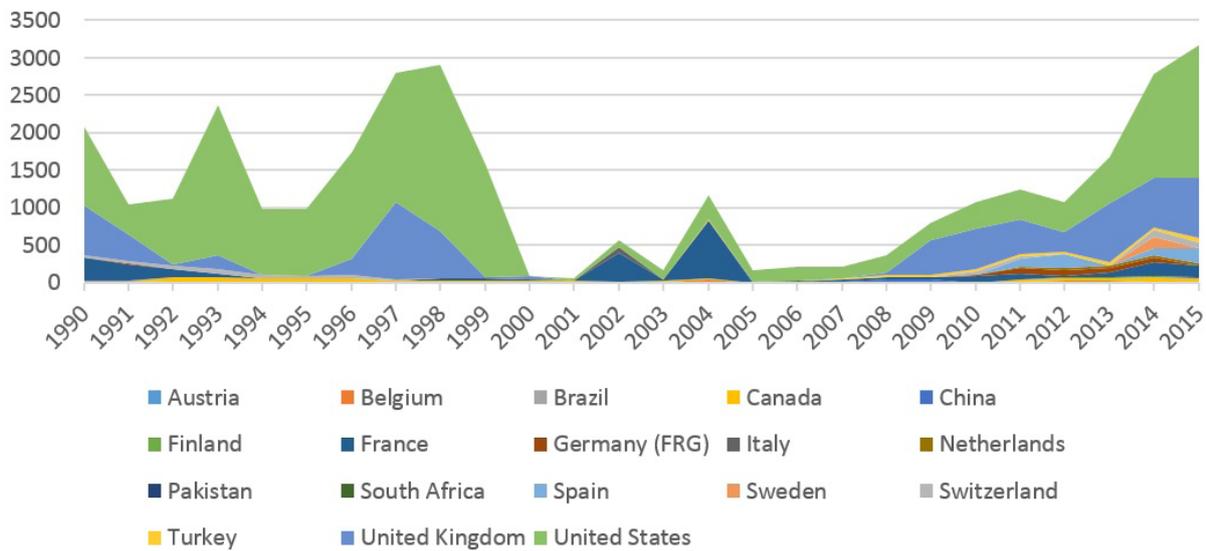
Most MENA countries have spent between 1.5 and 8 percent of their GDP on the military. The notable exceptions are Kuwait, which spent 49 percent of its GDP spent on its military in 1990; and Iraq and Iran, which spent 17 and 14 percent respectively in the early 1990s. Iraq and Iran remain the hotspots for investment in the military in relation to their GDPs, along with Saudi Arabia, which has increased its expenditure on its military forces in recent years. Figures 19-23 show selected MENA countries and their arms suppliers, generated from the SIPRI database.

Figure 19 | Military expenditure in percentage of GDP



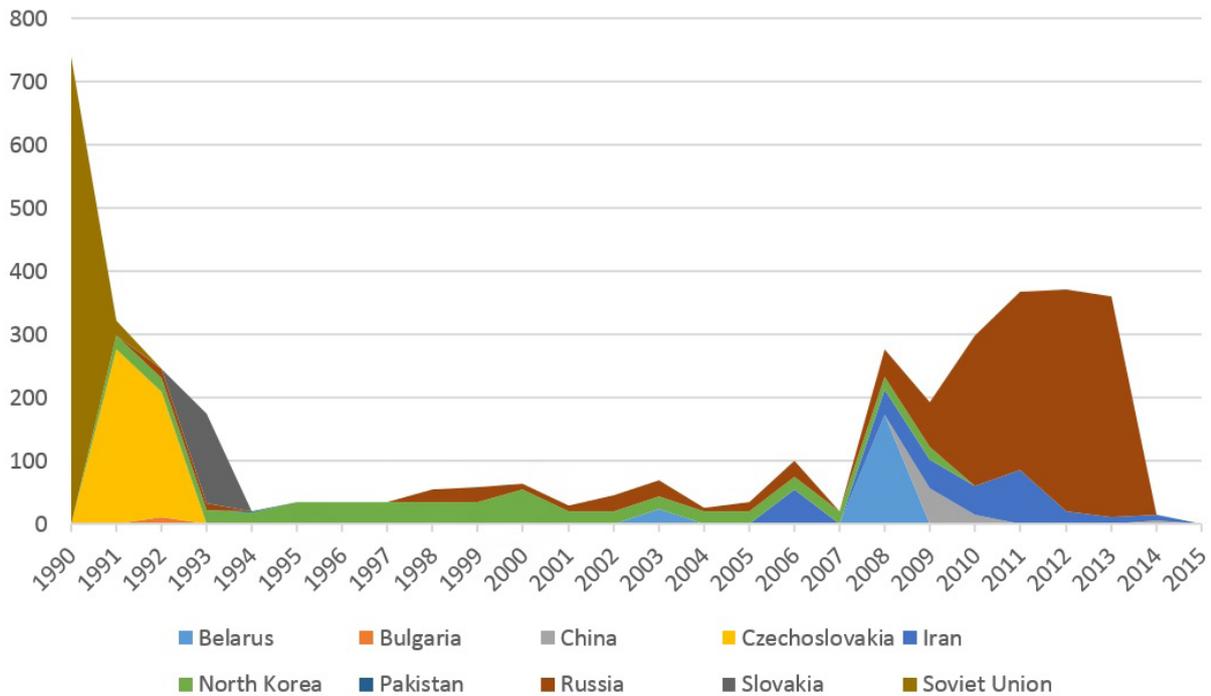
Source: World Bank 2016.

Figure 20 | Saudi Arabia arms imports (million dollars)



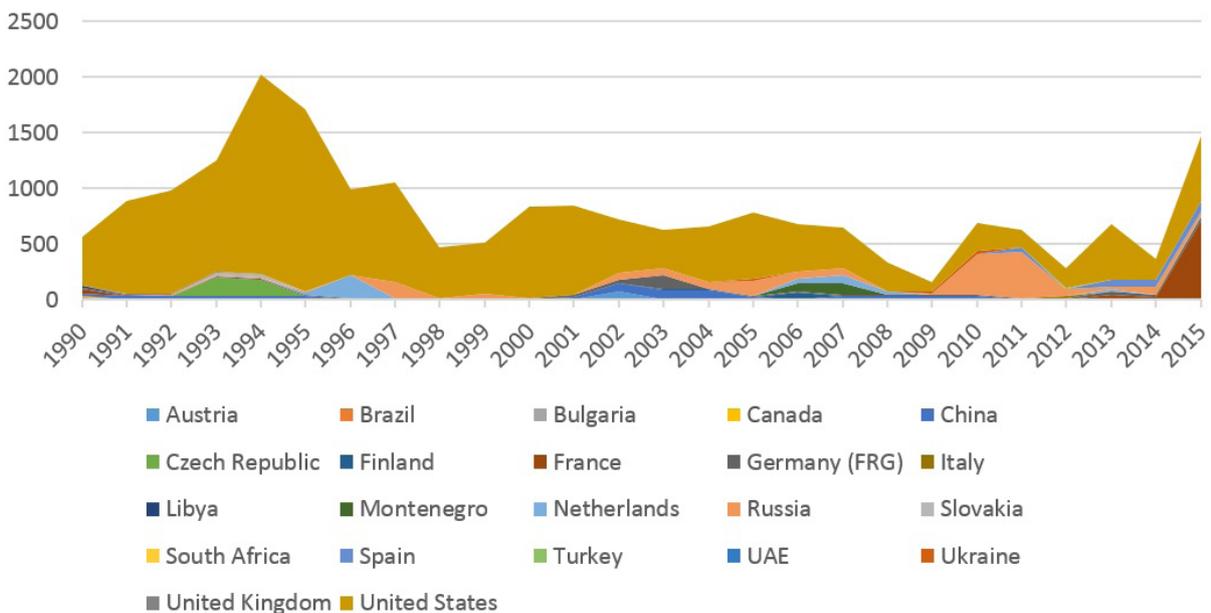
Source: SIPRI 2016.

Figure 21 | Syrian arms imports (million dollars)



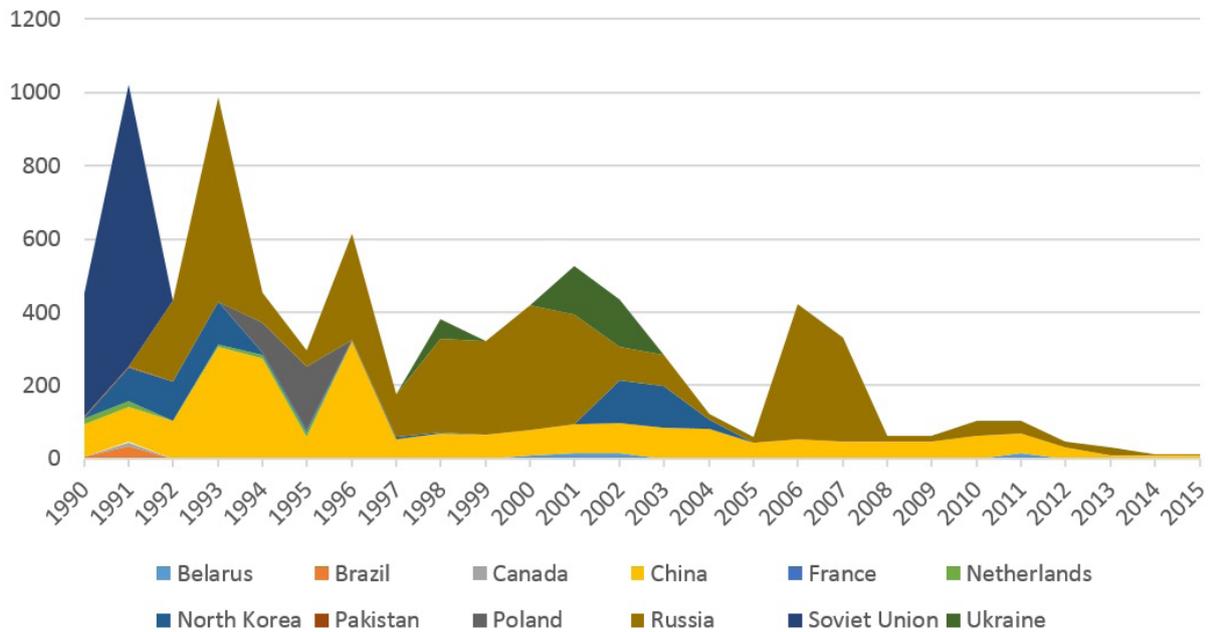
Source: SIPRI 2016.

Figure 22 | Egyptian arms imports (million dollars)



Source: SIPRI 2016.

Figure 23 | Iranian arms imports (million dollars)



Source: SIPRI 2016.

6. RELATIVE ROLE OF MATERIAL FACTORS IN SHAPING THE REGIONAL ORDER

Mapping material factors will be especially useful for identifying case studies to be carried out by the analysis component of MENARA in upcoming phases of the project. Material factors can and should support the selection of case studies to understand where current and future bottlenecks for political and economic stability in the geopolitically volatile region may arise.

As mentioned above, this background paper and the reports that will be produced in the framework of MENARA's WP3 will also inform the whole project on the relative role of material factors in shaping the regional and domestic orders and on the embeddedness of this region in global dynamics.

For instance, the demographics of the region are a major preoccupation for policy-makers in the MENA and constitute a considerable drain on its natural resources. In some countries birth rates have come down significantly (e.g. Iran, Tunisia, Lebanon), but in others this is less the case (e.g. Yemen, Iraq, Palestine) and some countries have witnessed a reacceleration of the total fertility rate among women over the past decade (Egypt) or have pushed for higher birth rates as they regard ageing demographics as a strategic liability (Iran, Turkey). Until population growth levels out after 2050, the region's governments need to create jobs for new entrants into the labour market, otherwise they face the risk of restive youth populations. As the population will roughly double by 2050, water resources will be stressed even further and food net imports will rise as self-sufficiency ratios are bound to decline. This situation will be aggravated by climate change.

The ability to earn the necessary foreign exchange for vital imports might be compromised as revenues from oil and natural gas exports have decreased in many countries. All MENA countries have witnessed steep growth in domestic energy consumption because of a mixture of economic and population growth, inefficient technologies and subsidized pricing patterns that encourage wasteful consumption. Many countries have suffered production declines as a result of unrest and/ or mature oil fields (e.g. Syria, Yemen, Libya, Egypt), while even in the oil-rich Gulf countries and Algeria skyrocketing domestic demand could reduce export capacity.

Combined with lower oil prices in the wake of the US shale revolution and suppressed demand in crisis-ridden developed countries this has led to reduced export revenues and the need for international borrowing and asset repatriation. The ability of Gulf countries to engage in cheque book diplomacy and lend a helping hand to regional clients such as Egypt, Sudan, Jordan and Morocco has been compromised. Their political influence in the region will likely decline, while actors with more diversified economies such as Israel, Turkey and Iran will find it easier to maintain or expand their regional standing.

More domestic energy production in the US has affected demand for light oil from countries such as Libya, Algeria or Nigeria, but not so much for the sour crudes of the Gulf region, which US refiners still need for their feedstock mix. As oil is a fungible commodity, the MENA's lasting importance for global oil markets still looms large in US energy security calculations. Outside actors like Russia and the US will play an important role in the region amid the relative weakness of budding regional hegemony, geopolitical competition and new openings as some countries in the region experience an increased need for external funding.

7. PRIORITY AREAS FOR RESEARCH

The MENA database/tool created by WP3 will be addressing priority areas for research. It will first provide baseline research questions on demography, environment, economic issues, energy and militarization.

Baseline research questions:

- what are the key dynamic trends?
- where are the greatest agricultural and urban (domestic) water stressed and opportunities?
- what is the contribution of groundwater, reservoirs, etc. to water security risks/opportunities?
- where are the greatest food security risks/opportunities in terms of availability, access, utilization, stability?
- where are the greatest energy security risks/opportunities?
- what are the energy trends vis-à-vis security?
- what is the role of the EU (e.g. import, policy strategy, energy risk for EU, transportation, export potential)?
- where are the greatest risks to the environment and biodiversity (climate change, land degradation)?
- where are the greatest economic and labour risks and opportunities?
- what is the role of HDI, GDP performance, FDI, development assistance, employment (youth), subsidies (account surpluses), education?

- where are the demographic risks/opportunities (e.g. migration, brain-drain)?
- where are the militarization expenditures, size, technologies (army, navy, air force)?

After the baseline questions have been established and data uploaded to the MENARA tool, the database will be able to project trends and build scenarios.

Trends-projection and scenarios:

- how might population growth and redistribution (migration) affect the distribution of risks?
- how might climate change affect the distribution of risks to food, water and environment/biodiversity?
- how might increasing globalization affect the distribution of risks?
- how might declining global trade and cooperation affect the distribution of risks?
- how might increasing regional and global trade affect the distribution of risks?
- how might (military) conflict affect the distribution of risks?
- how might changing oil prices affect the distribution of risks?

This exercise will then lead to the analysis of policy-options for the EU in the MENA region.

Examples of policy-options for the EU:

- unilateral and multilateral aid for key sectors such as urban water and energy systems, agriculture and education to limit population growth;
- increased food trade with other world regions, including FDI in land;
- water infrastructural investments (dams, water treatment);
- energy diversification (solar, wind and geothermal);
- environmental protection of ecosystems;
- coastal protection measures;
- direct budget support of MENA countries.

MENARA will also build a combined risk index for the material factors in the report to highlight the combined water, food, environment, economic, energy and thus geopolitical risk distribution under the current baseline and changes under scenarios and intervention. This would be a horizon scanning indicator of long term pressures arising in this region.

CONCLUSIONS

This paper has provided the background of the main material factors that shape the MENA regional order. It sets the scene for MENARA's Work Package 3 led by King's College London. The background paper has therefore introduced and discussed the current key literature and key databases on demography, the environment, energy, economic issues and militarization trends. The utility of the different databases has been discussed to show what will be fed into a MENARA tool developed by King's College London. The data on the different material factors will be used to develop a baseline which covers the different challenges from the viewpoint of EU decision-makers. The data will further allow trends-projection and scenario building for users to understand the effects of, for example, climate change or population growth. Finally, the scenarios will allow decision-makers to examine policy options.

REFERENCES

- Abbas, Tehmina et al. (2015), *Middle East and North Africa Government Defence Anti-Corruption Index 2015*, London, Transparency International, October, <http://government.defenceindex.org/view-report-dataset>
- Abou-Korin, Antar A. and Faez Saad Al-Shihri (2011), "Impacts of Rapid Urbanisation in the Arab World: the Case of Dammam Metropolitan Area", in *Journal of Sustainable Development*, Vol. 8, No. 9 (December), p. 52-65, <http://dx.doi.org/10.5539/jsd.v8n9p52>
- Ali, Omer and Ibrahim Elbadawi (2012), "The Political Economy of Public Sector Employment in Resource Dependent Countries", in *ERF Working Papers*, No. 673 (May), <http://erf.org.eg/?p=2431>
- Allan, Tony (2001), *The Middle East Water Question. Hydropolitics and the Global Economy*, London/New York, I.B.Tauris
- Allan, Tony (2011), *Virtual Water. Tackling the Threat to Our Planet's Most Precious Resource*, London/New York, I.B.Tauris
- Al Masah Capital (2011), *Unlocking the Potential of Alternative Energy in MENA*, Dubai, Al Masah Capital
- Al-Shalabi, Abdulaziz, Nicolas Cottret and Emanuela Menichetti (2014), "EU-GCC Cooperation on Energy", in Silvia Colombo, ed., *Bridging the Gulf: EU-GCC Relations at a Crossroads*, Rome, Nuova Cultura (IAI Research Papers 14), p. 157-222, <http://www.iai.it/en/node/1939>
- Alvaredo, Facundo and Thomas Piketty (2014), "Measuring Top Incomes and Inequality in the Middle East: Data Limitations and Illustration with the Case of Egypt", in *ERF Working Papers*, No. 832 (May), <http://erf.org.eg/?p=1743>
- Amara, Jomana (2008), "Military Industrialization and Economic Development: Jordan's Defense Industry", in *Review of Financial Economics*, Vol. 17, No. 2, p. 130-145
- Amnesty International (2011), *Arms Transfers to the Middle East and North Africa. Lessons for an effective Arms Trade Treaty*, London, Amnesty International, October, <https://www.amnesty.org/en/documents/act30/117/2011/en/>
- Auty, Richard M. (1990), *Resource-Based Industrialization. Sowing the Oil in Eight Developing Countries*, Oxford, Clarendon Press
- Borchert, Heiko and Cyril Widdershoven (2016), "The Dawn of a New Arab Defense Industrial Network", in *Arab Defense Industry Papers*, No. 1 (July), https://www.arabdefenseindustry.com/cmsfiles/publications/ADIP_01-16_3.pdf

BP (2016), *Statistical Review of World Energy 2016*, June, <http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>

Breisinger, Clemens, Olivier Ecker and Perrihan Al-Riffai (2011), "Economics of the Arab Awakening: From Revolution to Transformation and Food Security", in *IFPRI Policy Briefs*, No. 18 (May), <https://www.ifpri.org/node/2419>

Cammett, Melani et al. (2015), *A Political Economy of the Middle East*, 4th ed., Boulder, Westview Press

Breisinger, Clemens et al. (2012), "Beyond the Arab Awakening. Policies and Investments for Poverty Reduction and Food Security", in *IFPRI Food Policy Reports*, February, <http://www.ifpri.org/node/2421>

Breisinger, Clemens et al. (2012), *Beyond the Arab Awakening. Policies and Investments for Poverty Reduction and Food Security*, Washington, IFPRI, February, <http://dx.doi.org/10.2499/9780896295452>

Chang, Ha-Joon (2002), *Kicking Away the Ladder. Development Strategy in Historical Perspective*, London, Anthem

Chang, Ha-Joon (2003), *Globalisation, Economic Development and the Role of the State*, London/ New York, Zed Books

Cordesman, Anthony H. (2015), *Military Spending and Arms Sales in the Gulf*, Washington, CSIS, 28 April, <https://www.csis.org/node/25248>

Cordesman, Anthony H. (2016a), *The Changing Patterns of Arms Imports in the Middle East and North Africa*, Washington, CSIS, February, <https://www.csis.org/node/35087>

Cordesman, Anthony H. (2016b), *Risks and Instability in the Middle East and North Africa in 2016*, Washington, CSIS, January, <https://www.csis.org/node/35048>

Desertec Industrial Initiative (2012), *Desert Power 2050. Perspectives on a Sustainable Power System for EUMENA*, München, Dii GmbH, <http://www.desertenergy.org/?p=521>

Devarajan, Shantayanan (2015), *An Exposition of the New Strategy, 'Promoting Peace and Stability in the Middle East and North Africa'*, Washington, World Bank, January, <http://hdl.handle.net/10986/23773>

Ebinger, Charles et al. (2011), "Options for Low-Carbon Development in Countries of the Gulf Cooperation Council", in *Brookings Policy Briefs*, No. 11-02 (June), <http://brook.gs/2cboiCJ>

The Economist (2016), "Look Forward in Anger", in *The Economist*, 6 August, p. 1-9, <http://www.economist.com/news/briefing/21703362-treating-young-threat-arab-rulers-are-stoking-next->

revolt-look-forward-anger

Evans, Peter (1995), *Embedded Autonomy. States and Industrial Transformation*, Princeton, Princeton University Press

Fargues, Philippe (2012), "Demography, Migration, and Revolt in the South of the Mediterranean", in Cesare Merlini and Oliver Roy, eds., *Arab Society in Revolt. The West's Mediterranean Challenge*, Washington, Brookings Institution Press, p. 17-46

Ferroukhi, Rabia et al. (2013), "Renewable Energy in the GCC: Status and Challenges", in *International Journal of Energy Sector Management*, Vol. 7, No. 1 (2013), p. 84-112

Galal, Ahmed and Hoda Selim (2012), "The Elusive Quest for Arab Economic Development", in *ERF Working Papers*, No. 722 (November), <http://erf.org/?p=2247>

Gates, Scott et al. (2010), *Consequences of Armed Conflict in the Middle East and North Africa Region*, Oslo, Centre for the Study of Civil War (PRIO), 23 November, http://folk.uio.no/haavarmn/MENA_Cons_Conflict.pdf

Gaub, Florence (2014), "Arab Armies: Agents of Change? Before and After 2011", in *Chaillot Papers*, No. 131 (March), <http://www.iss.europa.eu/publications/detail/article/arab-armies-agents-of-change-before-and-after-2011>

Gaub, Florence (2014), "Arab Military Spending: Behind the Figures", in *EUISS Alerts*, No. 27 (May), <http://www.iss.europa.eu/publications/detail/article/arab-military-spending-behind-the-figures>

Gelb, Alan et al. (1988), *Oil Windfall. Blessing or Curse?*, Oxford, Oxford University Press, <http://documents.worldbank.org/curated/en/536401468771314677>

Gleick, Peter H. (2014), "Water, Drought, Climate Change, and Conflict in Syria", in *Weather, Climate, and Society*, Vol. 6, No. 3 (July), p. 331-340

Hart, Karen (2010), "GCC Gas Shortage to Force Removal of Subsidies", in *Emirates 24/7*, 5 September, <http://www.emirates247.com/business/energy/gcc-gas-shortage-toforce-removal-of-subsidies-2010-09-05-1.287606>

Henry, Clement M. and Robert Springborg (2010), *Globalization and the Politics of Development in the Middle East*, 2nd ed., Cambridge, Cambridge University Press

Hertog, Steffen (2010), "Defying the Resource Curse: Explaining Successful State-Owned Enterprises in Rentier States", in *World Politics*, Vol. 62, No. 2 (April), p. 261-301, <http://eprints.lse.ac.uk/29834>

Hertog, Steffen, ed. (2012), *The Gulf Region. Economic Development and Diversification. Vol. 3, National Employment, Migration and Education in the GCC*, Berlin, Gerlach Press

Holtom, Paul and Mark Bromley (2010), "The International Arms Trade: Difficult to Define, Measure and Control", in *Arms Control Today*, Vol. 40, No. 6 (July/August), p. 8-14, <https://www.armscontrol.org/node/4306>

Ianchovichina, Elena, Josef Loening and Christina Wood (2012), "How Vulnerable are Arab Countries to Global Food Price Shocks?", in *World Bank Policy Research Working Papers*, No. 6018 (March), <http://hdl.handle.net/10986/11976>

Ianchovichina, Elena, Lili Mottaghi and Shantayanan Devarajan (2015), "Inequality, Uprisings, and Conflict in the Arab World", in *Middle East and North Africa Economic Monitor*, October, <http://hdl.handle.net/10986/22711>

IMF (2016), *World Economic Outlook Dataset*, updated 19 July, <http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx>

IOM (2016), *Middle East and North Africa*, <http://www.iom.int/middle-east-and-north-africa>

Keulertz, Martin and Eckart Woertz (2015a), "Financial Challenges of the Nexus: Pathways for Investment in Water, Energy and Agriculture in the Arab World", in *International Journal of Water Resources Development*, Vol. 31, No. 3, p. 312-325

Keulertz, Martin and Eckart Woertz (2015b), "States as Actors in International Agro-Investments", in *International Development Policy*, Vol. 6, No. 1, p. 30-52, <https://poldev.revues.org/2023>

Luciani, Giacomo (1987), "Allocation vs. Production States. A Theoretical Framework", in Hazem Beblawi and Giacomo Luciani, eds., *The Rentier State*, London/New York, Croom Helm, p. 63-82

Luciani, Giacomo, ed. (2012), *The Gulf Region. Economic Development and Diversification. Vol. 4, Resources Blessed. Diversification and the Gulf Development Model*, Berlin, Gerlach Press

Makiya, Kanan (1998), *Republic of Fear. The Politics of Modern Iraq*, Berkeley, University of California Press

Melamed, Claire (2014), "Development Data: How Accurate Are the Figures?", in *The Guardian*, 31 January, <https://gu.com/p/3ma2y/stw>

MESIA/Middle East Solar Industry Association (2015), *MENA Solar Outlook 2015*, Dubai, January, <http://www.mesia.com/wp-content/uploads/Mesia-Rev3-5.pdf>

MESIA/Middle East Solar Industry Association (2016), *MENA Solar Outlook 2016*, Dubai, January, <http://www.mesia.com/?p=7455>

Müller, Simon, Ada Marmion and Milou Beerepoot (2011), "Renewable Energy: Markets and Prospects by Regions", in *IEA Information Papers*, November, <https://www.iea.org/publications/freepublications/publication/renewable-energy-markets-and-prospects-by-regions.html>

Mulligan, Mark (2015), "Climate Change and Food-Water Supply from Africa's Drylands: Local Impacts and Teleconnections through Global Commodity Flows", in *International Journal of Water Resources Development*, Vol. 31, No. 3, p. 450-460

Nadimi, Farzin (2015), "How Iran's Revived Weapons Exports Could Boost Its Proxies", in *PolicyWatch*, No. 2471 (17 August), <http://washin.st/2hciw4E>

Oldeman, L.R., R.T.A. Hakkeling and W.G. Sombroek (1991), *World Map of the Status of Human-Induced Soil Degradation. An Explanatory Note*, second revised ed., Wageningen/Nairobi, International Soil Reference and Information Centre/United Nations Environment Programme, October, <http://www.isric.org/projects/global-assessment-human-induced-soil-degradation-glasod>

Pal, Jeremy S. and Elfathir A.B. Elthair (2015), "Future Temperature in Southwest Asia Projected to Exceed a Threshold for Human Adaptability", in *Nature Climate Change*, Vol. 6, p. 197-200

Parenti, Christian (2011), *Tropic of Chaos. Climate Change and the New Geography of Violence*, New York, Nation Books

Perlo-Freeman, Sam (2009), "Arms Transfers to the Middle East", in *SIPRI Background Papers*, July, http://books.sipri.org/product_info?c_product_id=388

Qader, Mohammed Redha (2009), "Electricity Consumption and GHG Emissions in GCC Countries", in *Energies*, Vol. 2, No. 4 (December), p. 1201-1213, <http://dx.doi.org/10.3390/en20401201>

REN21 (2014), *Renewables 2014 Global Status Report*, Paris, REN21 Secretariat, <http://www.ren21.net/GSR-2014-Report-Full-report-EN>

REN21 (2015), *Renewables 2015 Global Status Report*, Paris, REN21 Secretariat, <http://www.ren21.net/GSR-2015-Report-Full-report-EN>

REN21 (2016), *Renewables 2016 Global Status Report*, Paris, REN21 Secretariat, <http://www.ren21.net/GSR-2016-Report-Full-report-EN>

Rother, Björn et al. (2016), "The Economic Impact of Conflicts and the Refugee Crisis in the Middle East and North Africa", in *IMF Staff Discussion Notes*, No. 16/8 (September), <http://www.imf.org/external/pubs/cat/longres.aspx?sk=44228>

Sab, Randa (2014), "Economic Impact of Selected Conflicts in the Middle East: What Can We Learn from the Past?", in *IMF Working Papers*, No. 14/100 (June), <https://www.imf.org/external/pubs/cat/longres.aspx?sk=41639>

Sachs, Jeffrey D. and Andrew M. Warner (1995), "Natural Resource Abundance and Economic Growth", in *NBER Working Papers*, No. 5398 (December), <http://www.nber.org/papers/w5398>

Sowers, Jeannie, Avner Vengosh and Erika Weinthal (2011), "Climate Change, Water Resources, and the Politics of Adaptation in the Middle East and North Africa", in *Climatic Change*, Vol. 104, No. 3-4 (February), p. 599-627

Stevens, Paul (2003), "Resource Impact: Curse or Blessing? A Literature Survey", in *Journal of Energy Literature*, Vol. 9, No. 1 (June), p. 3-42

Surry, Eamon (2006), "Transparency in the Arms Industry", in *SIPRI Policy Papers*, No. 12 (January), http://books.sipri.org/product_info?c_product_id=188

Thuon, Simon (2013), *The Nile in Black. Colours of the Nile*, Entebbe, GWP

UK Trade Investment (2015), *UK Defence & Security Export Statistics for 2014*, <https://www.gov.uk/government/statistics/uk-defence-and-security-export-figures-2014>

UNDESA/United Nations Department for Economic and Social Affairs (2016), *World Population Prospects. The 2015 Revision*, <http://esa.un.org/unpd/wpp>

UNDP/United Nations Development Programme (2016), *Human Development Data (1980-2015)*, <http://hdr.undp.org/en/data>

UNECE/United Nations Economic Commission for Europe (2006), *Strategies for Monitoring and Assessment of Transboundary Rivers, Lakes and Groundwaters*, New York/Geneva, United Nations, <http://www.unece.org/index.php?id=11683>

UN-ESCWA/United Nations Economic and Social Commission for Western Asia and BGR/Federal Institute for Geosciences and Natural Resources (2013), *Inventory of Shared Water Resources in Western Asia*, New York, United Nations, <https://waterinventory.org/node/33>

UN-Habitat (2016), *Urban Data*, <http://urbandata.unhabitat.org>

van Schaik, Louise and Rosa Dinnissen (2014), "Terra Incognita: Land Degradation as Underestimated Threat Amplifier", in *Clingendael Reports*, January, <https://www.clingendael.nl/publication/clingendael-report-land-degradation-underestimated-conflict-risk-factor>

Verhoeven, Harry and Eckart Woertz (2012), "Mirage in the Desert: The Myth of Africa's Land Grab", in *CNN*, 9 July, <http://edition.cnn.com/2012/07/05/business/op-ed-africa-land-grab>

Verme, Paolo et al. (2014), *Inside Inequality in the Arab Republic of Egypt. Facts and Perceptions across People, Time, and Space*, Washington, World Bank, <http://hdl.handle.net/10986/17583>

Wade, Robert (2004), *Governing the Market. Economic Theory and the Role of Government in East Asian Industrialization*, 2nd paperback ed., Princeton, Princeton University Press

Waterbury, John (1983), *The Egypt of Nasser and Sadat. The Political Economy of Two Regimes*, Princeton, Princeton University Press

Willen, Bob, Mauricio Zuazua and Jim Hanna (2015), *GCC Defence Offset Programs. The Trillion-Dollar Opportunity*, Dubai, AT Kearney, <http://www.atkearney.com/documents/10192/3278959/GCC+defence+Offset+Programs+-+The+Trillion-Dollar+Opportunity+v2.pdf/4a92196a-fb52-4bb8-835c-cc4f04cf30ce>

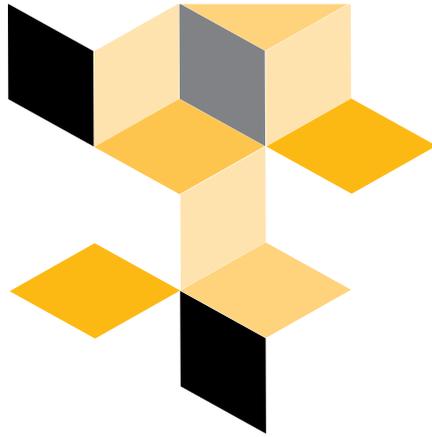
Woertz, Eckart (2013), *Oil for Food. The Global Food Crisis and the Middle East*, Oxford, Oxford University Press

Wolf, Katharina (2016), "Global Defence Spending 2015: The Big Picture", in *EUISS Alerts*, No. 9 (February), <http://www.iss.europa.eu/publications/detail/article/global-defence-spending-2015-the-big-picture>

World Bank (2016), *World Development Indicators*, Washington, World Bank, <http://data.worldbank.org/data-catalog/world-development-indicators>

Zeitoun, Mark, J.A. Allan and Yasir Mohieldeen (2010), "Virtual Water 'Flows' of the Nile Basin, 1998-2004: A First Approximation and Implications for Water Security", in *Global Environmental Change*, Vol. 20, No. 2 (May), p. 229-242

Zurayk, Rami (2011), "Use Your Loaf: Why Food Prices Were Crucial in the Arab Spring", in *The Guardian*, 17 July, <https://gu.com/p/3vdea/stw>



Middle East and North Africa Regional Architecture: Mapping geopolitical shifts, regional order and domestic transformations (MENARA) is a research project that aims to shed light on domestic dynamics and bottom-up perspectives in the Middle East and North Africa amid increasingly volatile and uncertain times.

MENARA maps the driving variables and forces behind these dynamics and poses a single all-encompassing research question: Will the geopolitical future of the region be marked by either centrifugal or centripetal dynamics or a combination of both? In answering this question, the project is articulated around three levels of analysis (domestic, regional and global) and outlines future scenarios for 2025 and 2050. Its final objective is to provide EU Member States policy makers with valuable insights.

MENARA is carried out by a consortium of leading research institutions in the field of international relations, identity and religion politics, history, political sociology, demography, energy, economy, military and environmental studies.



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