



Food and Agriculture
Organization of the
United Nations



The State of Land and Water Resources for Food and Agriculture

in the Near East and North Africa region

Summary report



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Food and Agriculture Organization of the United Nations
Cairo, 2022

Required citation:

FAO. 2022. *The State of Land and Water Resources for Food and Agriculture in the Near East and North Africa region – Summary report*. Cairo, FAO. <https://doi.org/10.4060/cc1137en>

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ISBN 978-92-5-136694-3

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ACKNOWLEDGEMENTS

This document is the synthesis report of the State of Land and Water Resources for Food and Agriculture (SOLAW) for the Near East and North Africa region. The report has benefited from the support and input of a number of individuals and specialized institutions:

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FOREWORD

This is the first edition of the State of Land and Water Resources for Food and Agriculture (SOLAW) and fills an important thematic gap for the Near East and North African (NENA) countries. It is intended as a FAO regional Office for the Near East and North Africa (RNE) flagship publication, presenting objective and comprehensive information and analyses on the current state, trends and challenges facing two of the most important agricultural production factors: land and water.

The report focuses on the state of land and water in the Near East and North Africa (NENA) region, which includes Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, the Syrian Arab Republic, Tunisia, the United Arab Emirates (UAE) and Yemen, as well as West Bank and Gaza Strip. Some of the tables and figures refer to the Arab region, which includes all the NENA countries plus Comoros, Djibouti and Somalia, in which case reference to the Arab region is made explicitly. Land and water resources are central to agriculture and rural development, and are deeply and intrinsically linked to the NENA regional challenges of food insecurity and poverty, rapid urbanization trends and climate change adaptation and mitigation, as well as the degradation and depletion of natural resources, all of which affect the livelihoods of almost 420 million people in the region.

In the past 70 years, NENA's population has grown sixfold, compared with a threefold increase worldwide. Current projections indicate that NENA's population will reach more than 633 million by 2050, with almost three-quarters living in the region's cities. This translates into increased demand for food, with urban populations demanding diversified diets. Population growth, coupled with changing consumption patterns, exerts significant pressures on scarce land and water resources. NENA is one of the world's regions predicted to be most affected by climate change, which is already altering crop productivity and growth cycles. An increase in mean temperatures, floods and droughts affects smallholders the most, as well as poorer populations with low capacities to adapt and populations experiencing conflict. Land and water resources – the basis of our food production – are finite and are under severe stress in NENA. To address these challenges, future agricultural production will need to be transformative, becoming more productive and sustainable, focused on farming systems and crops that most efficiently use water resources. An increase in innovative approaches in response to the impacts of climate change is urgently required, and climate-smart practices must be scaled up and out.

The variety of situations that characterize NENA's agricultural landscapes is at the core of SOLAW, from irrigated and rainfed systems to drylands and rangelands, as well as forest-based systems and important agricultural subsystems and associated ecosystems (mountain agriculture, oases, inland fisheries and aquaculture, deltas and coastal areas, urban and peri-urban agriculture). The report shows that many areas in NENA are experiencing high population densities, putting water and land resources under

increasing pressure and increasing the region's reliance on food imports and virtual water. The region has already reached the upper limits of production growth under the current resource constraints. The "food systems at risk" are now drawing the attention of the NENA community as a focus for urgent and concerted remedial intervention, including through investments, not only on a regional scale but also locally, where the consequences of inaction on agricultural livelihoods are likely to be the greatest. There is a pressing need for appropriate policies, institutions and investments to respond to water scarcity and land degradation, and to ensure sustainable and productive food systems management, while assuring acceptable levels of economic development.

A major objective of this publication is therefore to build awareness on the status of land and water resources in NENA and highlight current opportunities and challenges. Over the years, the Food and Agriculture Organization of the United Nations (FAO) has established itself as a unique source for a variety of global data on land and water. These data have been fully exploited in the preparation of this report, presenting the most comprehensive and up-to-date regional overview on the availability of land and water resources, their use and management, as well as future trends and developments. The report takes into consideration major drivers of regional change, including demands driven by demographics, land degradation, water-use challenges, urbanization and accompanying changing consumption patterns, climate change impacts and declining public and private investments in agriculture. A stronger focus on the urban-rural interface is called for, using both modern technologies and nature-based solutions. Numerous examples of actions already under way in different NENA countries are illustrated for potential replication. Examples include wastewater reuse, bioeconomy and circular economy approaches, climate-smart agricultural approaches, digital monitoring of land and water resources, territorial but also decentralized planning approaches, and knowledge sharing at different levels. Since many issues are transboundary, the need for territorial planning and negotiating mechanisms is significant for NENA countries.

Given increasing competition for land and water resources, choices of options inevitably require stakeholders to evaluate trade-offs among a variety of ecosystem goods and services. The evidence and knowledge in this report should serve to mobilize political will, priority setting and policy-oriented remedial actions, at the highest decision-making levels.



Abdulhakim Elwaer

Assistant Director-General

ACRONYMS AND ABBREVIATIONS

AFOLU	Agriculture, Forestry and Other Land Use
GDP	gross domestic product
CSA	climate-smart agriculture
LDC	least developed country
LDN	land degradation neutrality
GCC	Gulf Cooperation Council
IDP	internally displaced person
NDC	Nationally Determined Contribution
OWL	other wooded land
RCP	Representative Concentration Pathway
RICCAR	Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socioeconomic Vulnerability in the Arab region
SDS	sand and dust storm
SLWM	sustainable land and water management
UNDESA	United Nations Department of Economic and Social Affairs
VGSSM	FAO Guidelines for Sustainable Soil Management

EXECUTIVE SUMMARY

This report covers Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, the Syrian Arab Republic, Tunisia, the United Arab Emirates and Yemen. These countries in the Near East and North African (NENA) region are diverse in terms of natural features, including topography, climate, soil, vegetation, and populations and culture. Yet the countries have one thing in common – they are all located in the most land- and water-scarce region of the world. This FAO report, which provides the latest land and water resource statistics for the region, outlines important challenges that NENA as a whole is facing in the lead up to 2030 and beyond.

This ‘cradle of civilization’, where agriculture began more than 12 000 years ago, has coped with diverse and complex challenges over the years. The report outlines some opportunities to address the current land and water challenges, presenting examples from within the region on which to build. Transformative change is required, in particular with regard to how land and water resources are valued, used and reused. Much depends on the political will of various actors and incentives for change processes that are put in place.

The report outlines how recent drivers of land and water resource use are primarily the result of a rapid population increase that has occurred in the past 70 years. High population growth and urbanization aggravate already fragile resources, impacting available land and water resources. The world population has increased three times since 1950, but the population in NENA has grown sixfold. In 2020, there were 418 million inhabitants in NENA and the figure is expected to continue to rise, reaching more than 633 million in 2050. At the same time, rural populations have declined. In 2018, people living in rural areas accounted for 40 percent of the total population, whereas in 1970 rural areas accounted for more than 60 percent. Two-thirds of the rural population are impoverished. Urban poverty is also notable, up to 20 percent in some cities.

Climate change projections do not provide a positive scenario for the NENA region, with higher temperatures and rainfall decrease generally predicted (although not in all areas), resulting in more drought and an increase in extreme events. Climate change vulnerability is high, with NENA ranked as the world’s most arid region. Despite the impacts that climate is having on farming systems, climate change does not yet receive adequate attention.

Agriculture remains a significant pillar for economic development in many countries of the region, yet investment in agriculture within NENA countries is generally low. Although agriculture remains important, it only accounts for 13 percent of gross domestic product (GDP). Productivity is low relative to other sectors. NENA is the only region in the world where harvest area shrinkage is expected by 2050. NENA countries now rely increasingly on imports to meet their populations’ needs. The NENA region was receiving about one-third of all international shipments of cereal, sheep meat and whole grains in 2019, and about one-fifth of all sugar, poultry meat, and skimmed milk imports. An over-reliance on food imports can also have political repercussions. The COVID-19 pandemic has had impacts on food security, exacerbating land and water inefficiencies. Food price increases

were recorded in 2020, while in some countries such as Lebanon, Sudan and the Syrian Arab Republic, price rises exceeded 116 percent.

Key water and land degradation challenges

Water stress is a phenomenon experienced by all NENA countries, with some experiencing high and extremely high levels. Eight countries feature in the world's top ten highest levels of water stress. The global figure for a per capita share of renewable water resources is 5 732 m³. Thirteen countries of the region have a per capita share of renewable water resources below 500 m³ annually; seven countries fall below 100 m³. Per capita freshwater availability has decreased by 78 percent in the past 50 years. This is much higher than the global figure of 59 percent. Nine NENA countries have suffered declines in per capita freshwater availability of more than 80 percent.

The region is therefore highly dependent on water resources from other regions, with 60 percent of all renewable water resources generated outside NENA boundaries. High dependency on transboundary groundwater aquifers in the region is also a challenge. A major change in water-use practice is required due to the severity of water scarcity and the further impacts of climate change on water availability, coupled with population growth.

Water-use efficiency is variable, with nearly half of NENA countries returning above world average figures. Agriculture is the major user of water, with irrigation accounting on average for 85 percent of water use. The NENA region has the highest percentage of cropland under irrigation, illustrating the strong dependency on water for agricultural production. Domestic water withdrawals account for only 10 percent. The region has seen additional pressure on limited water resources as a direct result of COVID-19-related hygiene measures.

Turning to the current state of land and soils, land degradation is a significant factor in NENA countries. The cost of land degradation in the region has been estimated at USD 9 billion per year, and has led to a reduction in the potential productivity of soil by about one-third in recent years. Degradation of rangelands in the Arab countries has been estimated at 3.3 percent of the land area, with some countries experiencing very high rates of rangeland degradation. Meanwhile, the region lost 12.8 percent of its forest cover and 16.9 percent of its area of other wooded lands (OWL) in the past 30 years. Almost two-thirds of NENA countries have less than 5 percent of their land under arable cultivation, with an overall range that extends from 0.25 percent in Oman to more than 25 percent in the Syrian Arab Republic, with considerable variation in arable land per capita. On average, arable land out of total land area in the region is less than half of the global average. Forest land cover is limited in the region, covering 2.47 percent of total land area in 2018, having declined by 13 percent in the past 30 years.

Soil salinity, water erosion and pollution are other challenges. Salt-affected soils in the NENA region cover 11.2 percent of its total land area. Secondary salinization due to irrigation affects land in some countries, with others facing major salinity challenges. In many countries, cities are encroaching on the best soils, with impacts on agricultural production and loss of fertile soils. Another issue is the inappropriate use of agrochemicals, which adversely affects soil fertility and water quality. In fact, 6 countries from the region are among the highest 20 countries in the world in terms of fertilizer consumption (kilograms per hectare of arable land). The NENA region is highly prone to sand and dust storms

(SDS), which cause total GDP losses estimated at about USD 13 billion each year. Some countries are, however, acquiring land for agricultural use in other countries. Sudan is the most targeted country in NENA for such agricultural land deals. Many NENA countries still do not have sufficiently robust regulatory frameworks to govern land tenure and land-use rights.

Following migration to cities, the complexities of the increasing urban population is a significant issue for NENA countries. Job creation is important for a growing youth population. Peri-urban and rural farmlands are under constant pressure from urbanization and degradation. Infrastructure development in cities is often at the expense of agricultural land, leading to land fragmentation.

As mentioned, NENA is one of the world's regions that is predicted to be worst affected by climate change. The region will experience an average mean temperature increase of 1.7 °C to 2.6 °C under Representative Concentration Pathway (RCP) 8.5,¹ with parts of the region seeing a rise of 4.8 °C by 2100 compared with the period 1985–2005. The highest increases in average mean temperature in the Arab region (more than 3 °C) are projected for non-coastal areas, including the Sahara Desert. A number of NENA countries are currently seeing the effects of climate change, with floods and droughts already having serious implications for agricultural yields. Droughts are expected to increase in frequency by 150 percent between 2020 and 2070, and flash floods will threaten coastal and low-lying agricultural areas such as the Nile Delta. Specific areas are particularly vulnerable to water stress, including all populated and arable lands. Crop yields are expected to decline due to a decrease in productivity accompanied by a shortage in the length of crop cycles. Continued changes in climate temperatures will have negative impacts on crop quantity and quality, which will affect food production.

The highest water-induced climate vulnerability areas, including in terms of adaptive capacity, are in the upper Nile Valley, the southwestern Arabian Peninsula, and the northern Horn of Africa. Rainfed farming systems are the most vulnerable farming system to climate change, which will threaten wheat, barley and other staple crops. Smallholders will be hardest hit by climate change, as well as populations living in the least developed countries (LDCs) and countries in conflict, due to low capacities to adapt, despite more moderate increases of temperature in some cases.

Populations across NENA have long played an integral, if not sometimes volatile role in the history of human civilization. Today, over one-quarter of NENA's 19 countries are affected by conflict. Hostilities and disputes have a massive impact on livelihoods, food security and natural resource degradation. Vital infrastructure is often damaged. Tension increases with regard to water resources (transboundary and national) and conflicts have direct adverse impacts on land use and management. As a result of conflict and environmental degradation, people flee their homelands. The NENA region hosts more than 40 million international migrants, of whom 14 million are intraregional migrants and more than 2 million are intraregional refugees. The Syrian Arab Republic currently has the highest number of internally displaced persons (IDPs) in the world. Not all countries host refugees and migrants on an equal scale – Saudi Arabia has the most migrants (3.4 million), while Jordan and Lebanon are among the top 10 countries in the world in terms of hosting refugees. Migrants, refugees and IDPs add pressure on the land in the areas where they settle, leading to land degradation and desertification.

¹ A Representative Concentration Pathway (RCP) is a greenhouse gas concentration trajectory adopted by the Inter-governmental Panel on Climate Change (IPCC). The fifth IPCC Assessment Report (2014) used four pathways for climate modelling. The pathways describe different climate futures, all of which are considered possible depending on the volume of greenhouse gases emitted in the years under consideration. The original pathways are now being considered with Shared Socioeconomic Pathways.

Possible responses and existing initiatives under way

As well as highlighting the challenges, this report presents some positive initiatives from the region and a range of options available to help authorities respond to the issues of land and water resources. A more urgent response to land and water scarcity is required and there are some regional political processes and opportunities under way to collectively address some of the challenges.

First and foremost, acknowledging and responding to the value of water will help to increase water productivity, deter wastage and overexploitation of water resources and promote water reallocation. If the management of water storage and delivery infrastructure is improved, regional economic benefits could range from between USD 7 and 10 billion per year. The public sector must strengthen its role as either the central financing enabler and/or put in place legislation for public-private-partnerships such as incentives to construct, upgrade, operate and maintain irrigation infrastructure.

Adoption of a circular economy for water that considers water reuse, better water accounting, and more effective water allocation mechanisms is urgently needed and where it exists, should be scaled out. Indeed, more options to increase water storage in the region should be investigated, such as rainwater capture, wastewater treatment, better use of green water (rainwater stored as soil moisture), micro-water harvesting techniques and floodwater diversion (spate irrigation), stormwater management in cities, and artificial aquifer recharge via micro-catchment management. Switching to crops that consume less water and produce higher returns should be encouraged, along with solar renewable energy-powered pumps for irrigation. More and more free data sets and portals are becoming available to assist the mapping of water resources and assessment of consumption. Unmanned aerial vehicles, digital soil mapping surveys, digital agriculture technologies, internet of things, and mobile phone applications using remote sensing data combined with online analysis tools are some of the technology-based solutions that can continue to be scaled out. Expertise, cooperation and knowledge sharing on digital innovations and what works should be enhanced in the region.

Costs of virtual water – the volume of water that is needed to produce food – and water accounting must be transparently referred to in trading and national water budgets, so that the hidden flow of water in food or other commodities is considered. Integrated water resource management plans are required to minimize increased pressure on water at the level of watersheds. Regardless of the technology options adopted by a government or local authority, consultative processes and community participation, including a deliberate focus on women (as important water users) should be embedded in institutional planning and implementation.

The Arab Declaration on Climate Change has spurred a regional response and initiated coordinated studies or operational responses to water scarcity. Examples include the RICCAR regional Knowledge Hub, the Arab Centre for Climate Change Policies, and the 2019 Cairo Declaration emanating from the first joint meeting of ministers of water and ministers of agriculture.

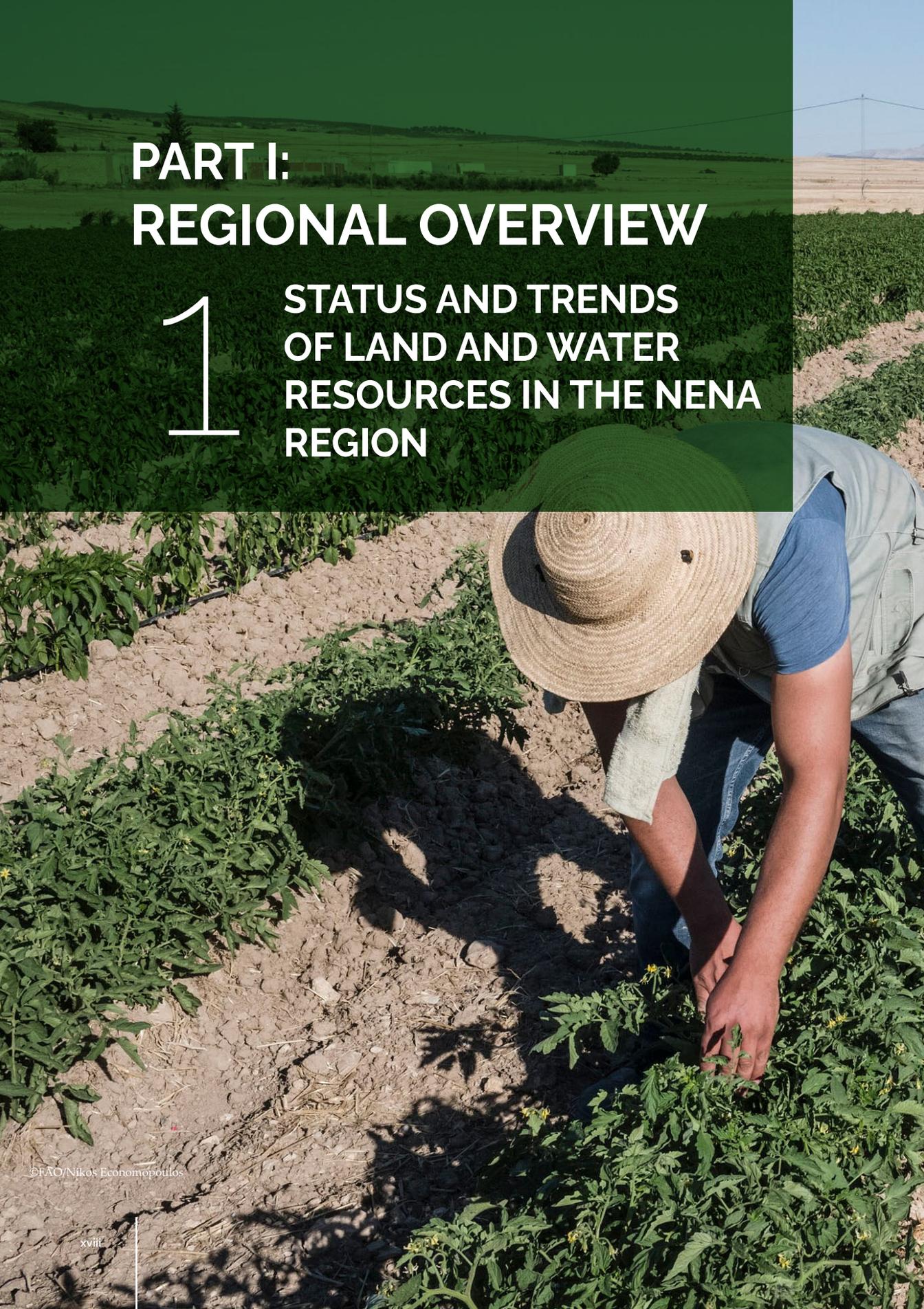
Turning to the restoration of land and soil health for sustainable agriculture, international global processes are stimulating interest in agriculture, with an acknowledgement

that integrated policies are needed to revive local economies, support natural resource regeneration and management and ensure food security. The UN Decade on Ecosystem Restoration (2021–2030) provides a focus for mainstreaming rehabilitation approaches in the NENA region, with an estimated 3.5 million km² of land potentially suitable for better sustainable land and water management (SLWM) practices (irrigated, rainfed and rangeland agro-ecosystems). It is important to note that 14 countries have set voluntary targets to achieve land degradation neutrality (LDN) by 2030. Sixteen NENA countries mention forest- and rangeland-related adaptation in their National Determined Contributions (NDCs), as measures to address climate change. Some countries have already set reforestation targets. FAO provides Guidelines for Sustainable Soil Management (VGSSM), which could prove highly useful for improved soil and water management. Digital innovations also offer valuable opportunities for the region, with remote sensing data helping to avoid, reduce and monitor soil health.

Agri-food systems will have to transform and adapt to climate change and natural resource scarcity. Climate-smart agricultural practices are being promoted by FAO and others in the region. The suite of CSA responses includes crop diversification, use of heat- and salt-tolerant crops, conservation agriculture with minimum tillage and crop rotation, adapted animal, fish and aquaculture varieties, and modification of sowing and planting time according to rainfall patterns. Bioeconomy concepts, including better use of waste, reducing food loss and waste, and wastewater recycling are major opportunities. The circular economy model aims to keep products, materials, equipment and infrastructure in use for longer periods.

Some of the countries' NDCs highlight that water, salinization and productivity losses are key adaptation priorities for the agriculture sector. Given that funding for water and sanitation, and Agriculture, Forestry, and Other Land Uses (AFOLU) sectors is five to seven times lower than for energy, transport, storage, industry and banking/finance, there are opportunities to use evidence from this report to channel climate finance flows towards addressing region-specific climate priorities in the agriculture, land and water sectors.

This report also calls for cities to reconnect with their rural territories, ensuring supply and demand for traditional and locally supplied fresh foods. In addition, urban and peri-urban agriculture can facilitate shorter supply chains. Indeed, there is strong scope for making use of digital technologies to facilitate better connections between smallholder farmers and cities – the COVID-19 pandemic has demonstrated how this is possible. Land and water management must be more effectively integrated within city watersheds. Green infrastructure and urban agriculture can be integrated in planning. Greener cities improve the quality of life and standard of living. Multiple environmental benefits may come about, such as flood control, reduction of stormwater runoff and soil sealing, as well as biodiversity protection. Otherwise, water availability, including both quality and quantity, will further deteriorate, severely affecting the resilience of urban communities. A functional multilevel governance system is required to address the significant challenges presented in this report, moving towards territorial governance.



PART I: REGIONAL OVERVIEW

1

STATUS AND TRENDS OF LAND AND WATER RESOURCES IN THE NENA REGION

KEY MESSAGES

- ▶ **The NENA region is dominated by deserts and a harsh environment.** The main characteristics are a high level of aridity and water stress, poor soils and limited arable land. Climate change projections predict higher temperatures and rainfall decrease, with more drought and extreme events. People living in coastal areas must prepare themselves for much more difficult futures than may be currently anticipated.
- ▶ **Water is the number one limiting factor for agriculture in the NENA region.** Understanding the sources of water withdrawals is key to understanding water stress in the region. Desalination is particularly important, given that about 50 percent of the world's desalination capacity is in the NENA region.
- ▶ **Freshwater availability per capita declined in NENA by 78 percent between 1962 and 2018.** This is much higher than the global figure of 59 percent. Nine NENA countries had reductions in freshwater availability per capita of over 80 percent, including all Gulf Cooperation Council (GCC) countries.²
- ▶ **Water stress levels are high in all NENA countries (except Mauritania).** Water stress ranges in NENA vary from 47 percent in Iraq to 3 850 percent in Kuwait. Values above 100 percent indicate overuse of water and/or a reliance on desalinated water. The world average of water stress is just over 18 percent (2018).
- ▶ **Water-use efficiency is variable in the region.** Almost half of NENA countries had levels of water-use efficiency greater than the world value in 2018. Good performance in water-use efficiency is generally found in the Mashreq and Gulf regions rather than the Maghreb. The NENA region has the highest percentage of cropland under irrigation in comparison with the global average, indicating a high dependency on water for agricultural production.
- ▶ **Land degradation is a significant feature of the region.** Soil salinity, water erosion and pollution are major challenges.
- ▶ **Arable land is scarce in NENA.** Under 5 percent of NENA's total land is arable, less than half of the global average. Twelve out of 19 NENA countries have less than 5 percent arable land. Arable land's share of total land in the region ranges from 0.25 percent to 25 percent. Arable land per capita is variable, with the lowest found in GCC countries (except Saudi Arabia).
- ▶ **Forestland cover is limited in the region.** Forests covered 2.47 percent of the total land area in the region in 2020 and OWL accounts for 2.36 percent. The NENA region experienced a loss of 12.5 percent in its forest cover and 16.9 of OWL between 1990 and 2020.
- ▶ **Aquaculture has emerged as an important sector in NENA.** Aquaculture doubled its production in ten years to reach 1.7 million tonnes and USD 2.3 billion worth in 2018. Aquaculture development has occurred with limited impact on land and water use, as good technologies are employed.

² The Gulf Cooperation Council is a regional, intergovernmental political and economic union that consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

FACTS AND FIGURES

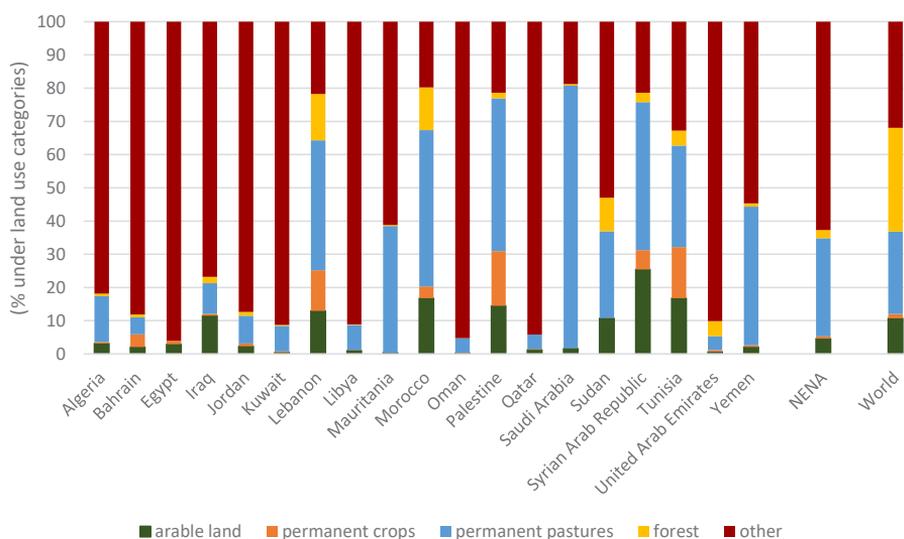
TABLE 1.1 MAIN AGRICULTURAL SYSTEMS AND RELEVANT SUBSYSTEMS IN THE NENA REGION

Agricultural systems	Length of growing period	Main production	Distribution of rural population (%)	Rural population density (persons/km ²)	Distribution of area excluding desert (km ²)	Main issues
Major agricultural systems						
Irrigated	Year-round	Wheat, fruits, vegetable, sugar cane sugar beet, fodder	32.6	170	8.9	Access to water, pollution, misuse of inputs
Rainfed	>150 days	Cereals (wheat), olive, fruit trees	21	45	21.7	Droughts, temperature increase
Dryland	90–150 days	Cereals (barley, millet), beans, livestock: goats, sheep	15.7	35	20.8	Droughts, access to markets, finance and inputs
Pastoral	30–90 days	Livestock: sheep, goats, camels	20.5	25	38.2	Access to basic services, heatwaves
Forest-based	>150 days		10.1	45	10.3	Deforestation, land degradation
Relevant subsystems						
Oases	< 30 days	Dates, vegetables				Overuse of water, access to markets and diversification of income
Mountains		Vegetables, fruit trees, legumes, cereals, livestock				Low investments, small size of plots, water scarcity, high production costs, lower productivity, access to markets

Agricultural systems	Length of growing period	Main production	Distribution of rural population (%)	Rural population density (persons/km ²)	Distribution of area excluding desert (km ²)	Main issues
Urban/peri-urban agriculture		Vegetables, fruits, dairy products				Urban encroachment, land tenure, access to quality water
Fisheries and aquaculture		Fish				Competition for land and water
Deltas and coastal areas		Rice, vegetables, cereals				Seawater intrusion, urban encroachment on arable land

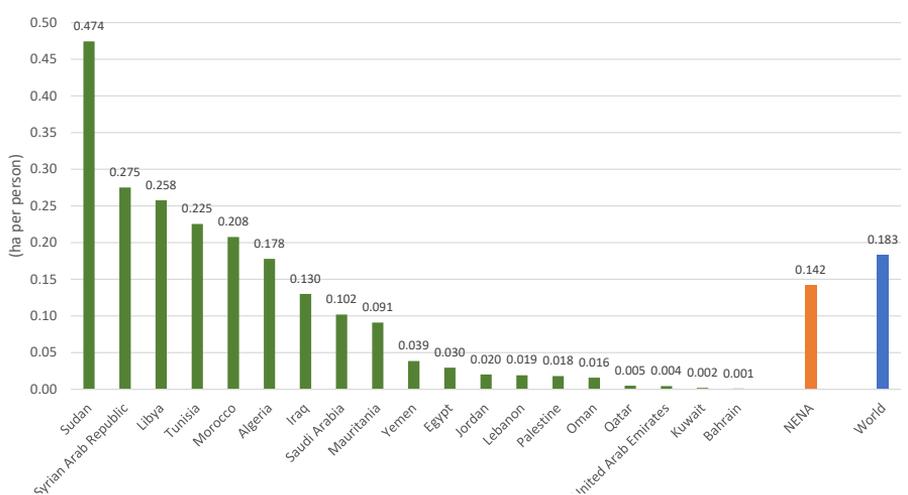
Source: Adapted from Dixon *et al.* (2001, 2019), FAO 2011 & Lewis *et al.*, 2018

FIGURE 1.1 PERCENTAGE OF LAND UNDER DIFFERENT LAND-USE CATEGORIES



Source: Calculated using data from FAOSTAT, 2021. Rome. Cited 04 April 2021. <https://www.fao.org/faostat/en/>

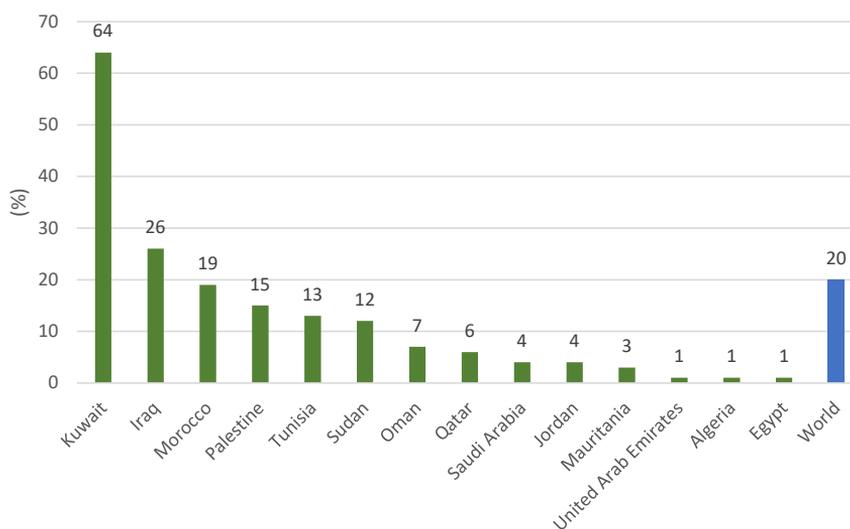
FIGURE 1.2 PER CAPITA ARABLE LAND IN 2018*



Source: Calculated using data from FAOSTAT, 2021. Rome. Cited 31 March 2021. <https://www.fao.org/faostat/en/>

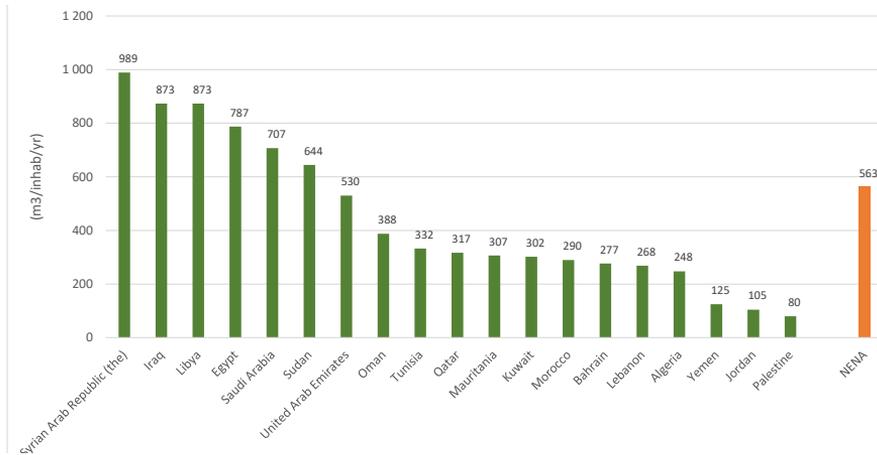
*Per capita arable land is calculated by dividing the total arable land area by the total population in each country/region.

FIGURE 1.3 PROPORTION OF LAND THAT IS DEGRADED OVER TOTAL LAND AREA (SDG 15.3.1), NENA, 2015



Source: UN Department of Economic and Social Affairs (UNDESA). 2021. *Global SDG Indicators Database*. (online). Cited 15 December 2021. <https://unstats.un.org/sdgs/indicators/database/>

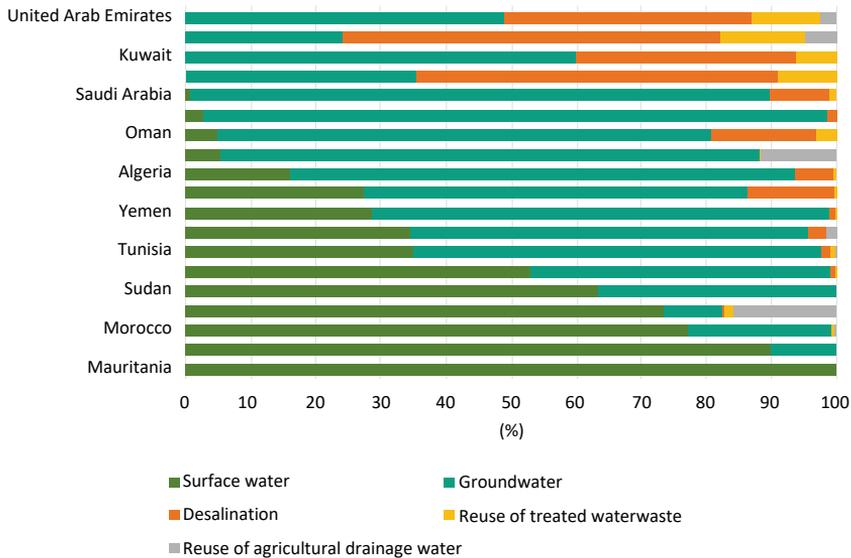
FIGURE 1.4 TOTAL WATER WITHDRAWAL PER CAPITA, NENA, 2018*



Source: FAO. 2021. AQUASTAT. In: *FAO.org*. Cited 11 July 2021. <http://www.fao.org/aquastat/en/>

*Total water withdrawal per capita for NENA is calculated as [total water withdrawal in relevant countries (10⁹ m³/yr) / 1 000 000] / [Total population in relevant countries (1 000 inhab)].

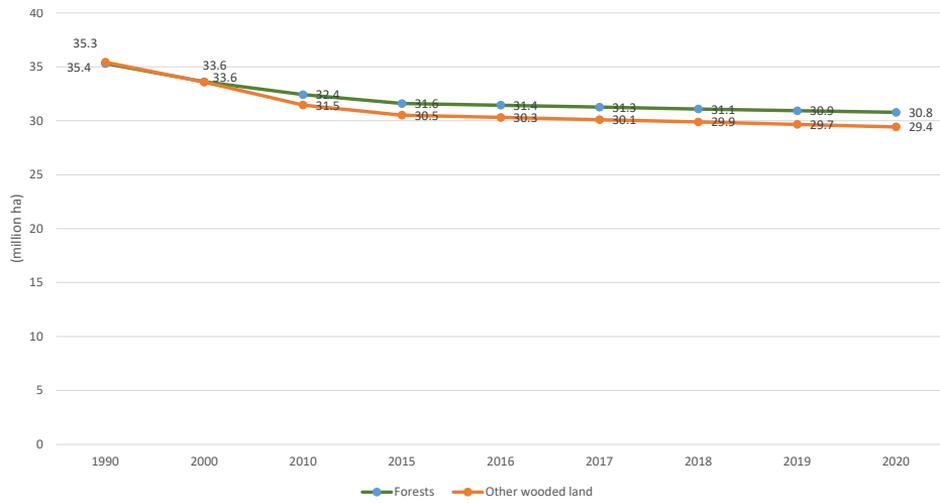
FIGURE 1.5 WATER WITHDRAWALS BY SOURCE PER TOTAL WATER WITHDRAWAL, NENA, 2015 AND 2017



Source: AQUASTAT and AbuZeid, K. & Wagdy, A. 2019. *3rd State of the Water Report for the Arab region*.

*Data for Jordan, Lebanon, Qatar and Tunisia are for 2017; data for the rest of NENA countries are for 2019.

FIGURE 1.6 TRENDS IN NENA FORESTS AND OTHER WOODED LAND AREAS BETWEEN 1990 AND 2020



Source: FAO, 2021. *Global Forest Resources Assessment*. Rome. Cited 07 April 2021. <https://fra-data.fao.org/WO/fra2020/extentOffForest>



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PART I:
REGIONAL OVERVIEW

2

DRIVERS OF LAND AND
WATER USE IN THE NENA
REGION

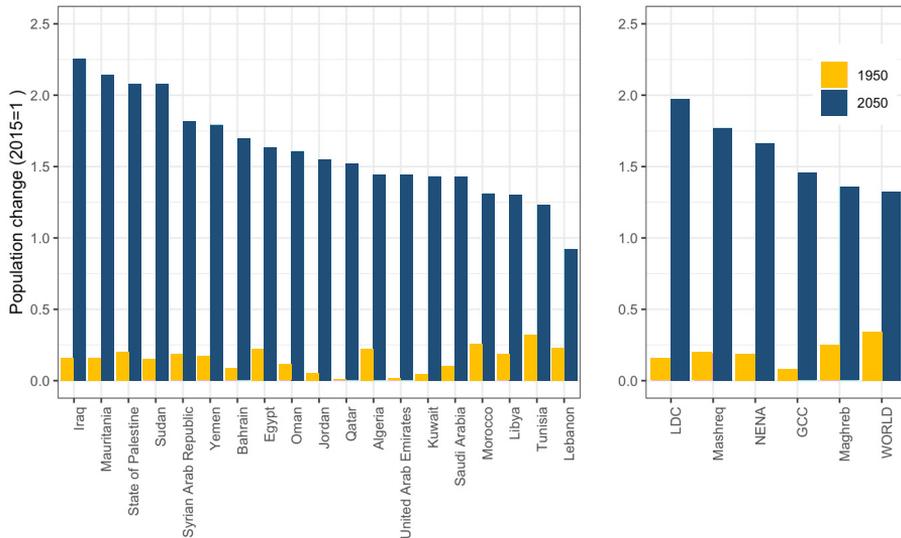


KEY MESSAGES

- ▶ **A rapid population increase has occurred in NENA since 1950.** While the world population increased three times since 1950, NENA grew sixfold. In 2020, there were 418 million inhabitants, but the figure is expected to rise until 2050, reaching over 633 million.
- ▶ **The region is rapidly urbanizing.** In 2018, people living in rural areas accounted for 40 percent of the total population, whereas in 1970 this figure was 60 percent.
- ▶ **Harvested areas are expected to shrink by 2050.** Population growth and urbanization aggravate already fragile land and water resources, with serious implications for sustaining or increasing food production in the region.
- ▶ **Countries in NENA rely on imports to meet the population's needs.** During a 50-year period (1960–2010), the food production-consumption gap increased.
- ▶ **The agriculture sector accounts for 13 percent of GDP.** The productivity gap between agriculture and non-agriculture sectors is quite high. In 2015, an agricultural worker produced around one-third of what is produced by workers in other sectors.
- ▶ **Poverty is a rural phenomenon across the region.** Two-thirds of the rural population is impoverished. Urban poverty is also notable, up to 20 percent in some urban centres.
- ▶ **Conflict affects several countries in the region.** Five out of 19 NENA countries are currently affected by conflict, which has a huge impact on livelihoods, food security, natural resource degradation and infrastructure, including tensions over water resources.
- ▶ **The NENA region hosts more than 40 million international migrants.** Almost 14 million migrants are intraregional, of whom more than 2 million are intraregional refugees. Jordan and Lebanon are among the top 10 countries in the world for hosting refugees.
- ▶ **The COVID-19 pandemic has impacted food security,** exacerbating inefficiencies. Increased food prices were recorded in 2020 (up to 167 percent). COVID-19-related hygiene measures have placed additional pressure on water resources for domestic use.
- ▶ **Climate change vulnerability is high, but does not yet receive adequate attention.** NENA is the most arid region in the world. Projections under the most severe scenario show a temperature increase of 2.6 °C by the end of the century, with some parts of the region reaching up to 5 °C. Despite projections for farming systems, climate change receives low recognition as a high-impact risk in the region.
- ▶ **Agricultural sector investment within NENA countries is low.** Agriculture remains an important pillar for economic development in many countries. Some have acquired land for agricultural use in other countries, with one NENA member state emerging as the region's most targeted country for land investments, both in terms of total area and number of agricultural land deals.
- ▶ **Political instability, conflicts, lack of cross-sectoral collaboration, poor governance and low public investment in agriculture are challenges.** Integrated policies are needed to revive local economies, support natural resource management and achieve food security.

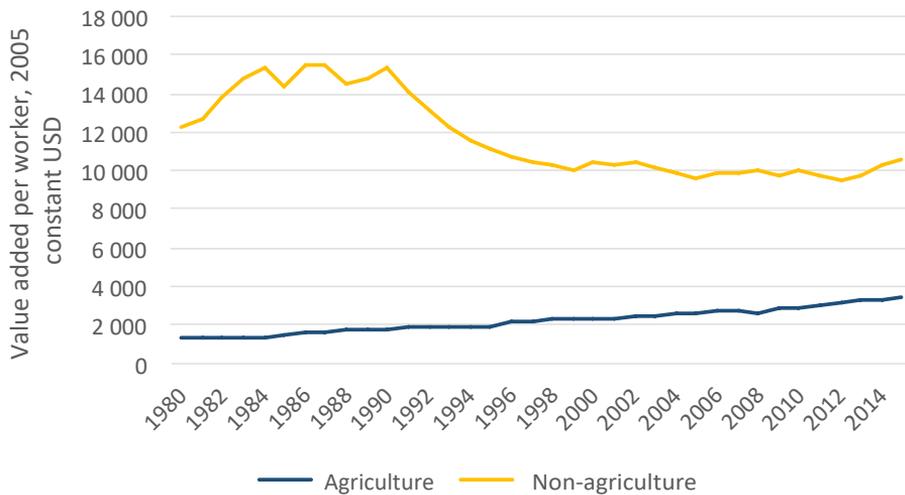
FACTS AND FIGURES

FIGURE 2.1 RELATIVE CHANGES IN POPULATION GROWTH 1950–2015 AND 2015–2050, INDEXED, 2015 =1



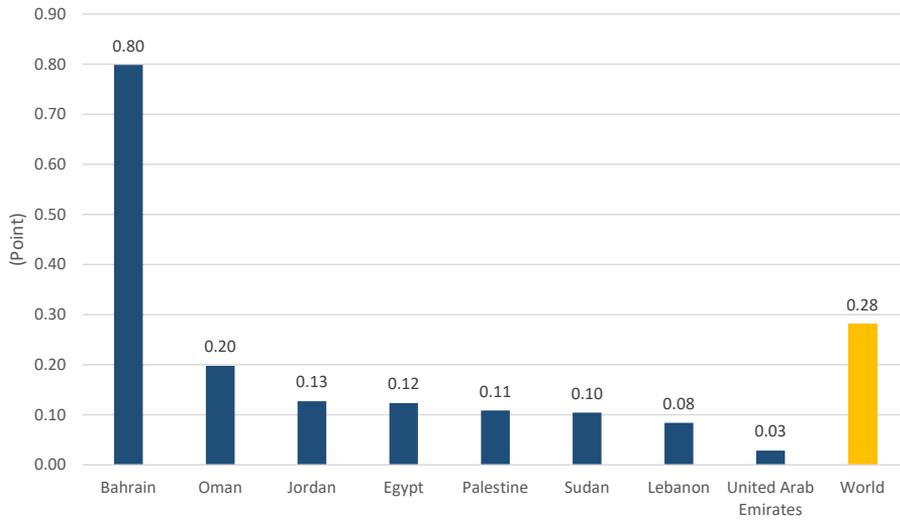
Source: United Nations, Department of Economic and Social Affairs (UNDESA) Population Division. 2019. *World Population Prospects 2019*, online edition. Rev. 1, <https://population.un.org/wpp/Download/Standard/Population/>

FIGURE 2.2 PRODUCTIVITY GAP BETWEEN AGRICULTURE AND NON-AGRICULTURE SECTORS

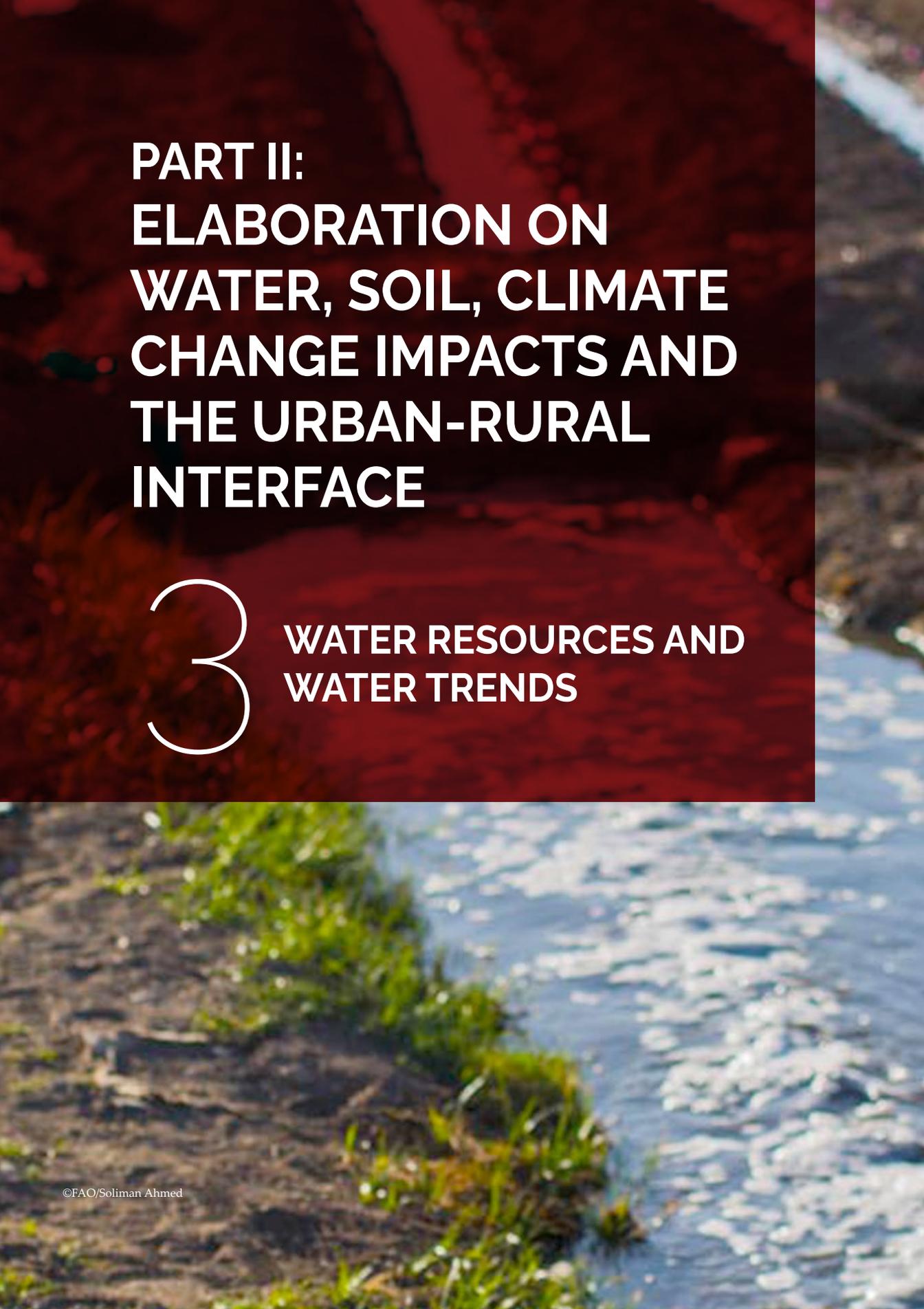


Source: FAO. 2019. *Rural transformation – Key for sustainable development in the Near East and North Africa*. Overview of Food Security and Nutrition 2018. Cairo.

FIGURE 2.3 AGRICULTURE ORIENTATION INDEX (AOI) FOR GOVERNMENT EXPENDITURES, ARAB WORLD, 2018



Source: FAO. *Sustainable Development Goals* [online]. Rome. Cited 15 December 2021. www.fao.org/sustainable-development-goals/overview/en/



**PART II:
ELABORATION ON
WATER, SOIL, CLIMATE
CHANGE IMPACTS AND
THE URBAN-RURAL
INTERFACE**

3

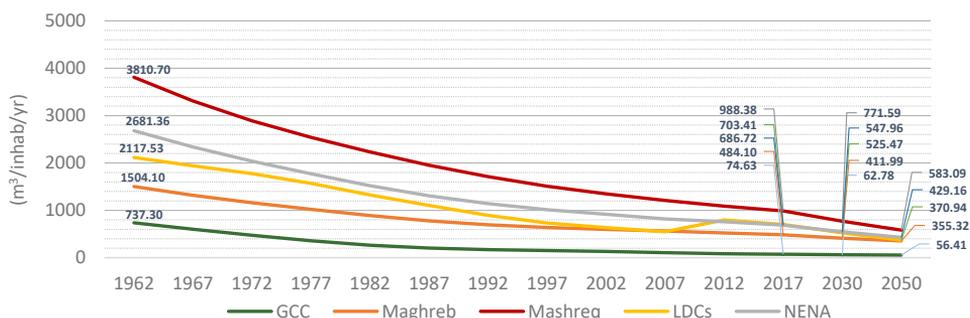
**WATER RESOURCES AND
WATER TRENDS**

KEY MESSAGES

- ▶ **Most NENA countries are characterized by high and extremely high levels of water stress.** Eight countries rank in the top 10 highest levels of water stress in the world. The global figure for per capita share of renewable water resources is 5 732 m³ per annum. Thirteen countries of the region have a per capita share below 500 m³ annually, with 7 countries below 100 m³.
- ▶ **NENA is highly dependent on water resources from other regions.** Sixty percent of all renewable water resources are generated outside the boundaries of the region, including a high dependency on transboundary groundwater aquifers. Climate change, environmental degradation, population growth, conflicts and COVID-19 are some common challenges affecting water resources.
- ▶ **Agriculture is the major user of water.** On average, irrigation accounts for 85 percent of water use. Switching to crops that consume less water with higher returns should be encouraged. Incentives to construct, upgrade, operate and maintain irrigation infrastructure are required.
- ▶ **A shift in agricultural water planning is required.** About 82 percent of wastewater remains untreated or is not used following treatment and could be exploited as a new water source for the agriculture sector. Rainwater capture, use of wetlands and other green-based solutions, better use of green water, and artificial aquifer recharge via micro-catchment management are some options.
- ▶ **Regional economic benefits from improved water infrastructure could range between USD 7 and 10 billion per year.** The public sector must strengthen its role as a financing enabler or put in place legislation for public-private-partnerships for water resources. Virtual water trade is an important component of national water budgets.
- ▶ **Technology-based solutions also offer potential.** Potential technology-based solutions include solar energy-powered pumps for irrigation, unmanned aerial vehicles, digital soil and water map surveys, digital agriculture technologies, and mobile phone applications using remote sensing data combined with online analysis tools using free data sets and portals.
- ▶ **Nature-based solutions hold potential to reach some sustainability goals.** Community-led approaches should be explored, for example micro-water harvesting techniques and floodwater diversion. Cultural and sacred aspects of water should not be forgotten.
- ▶ **A paradigm shift in water management is required.** Adoption of a circular economy that considers water reuse, better water accounting, acknowledging the value of water, and more effective water allocation mechanisms are all urgently needed. Consultative processes are also necessary, including with different users and acknowledging gender roles.
- ▶ **Cooperation and sharing knowledge on what works should be enhanced in the region.** Countries that have advanced in data management and digital innovation should share capacities to help move the region towards more resilient, productive food-water systems.

FACTS AND FIGURES

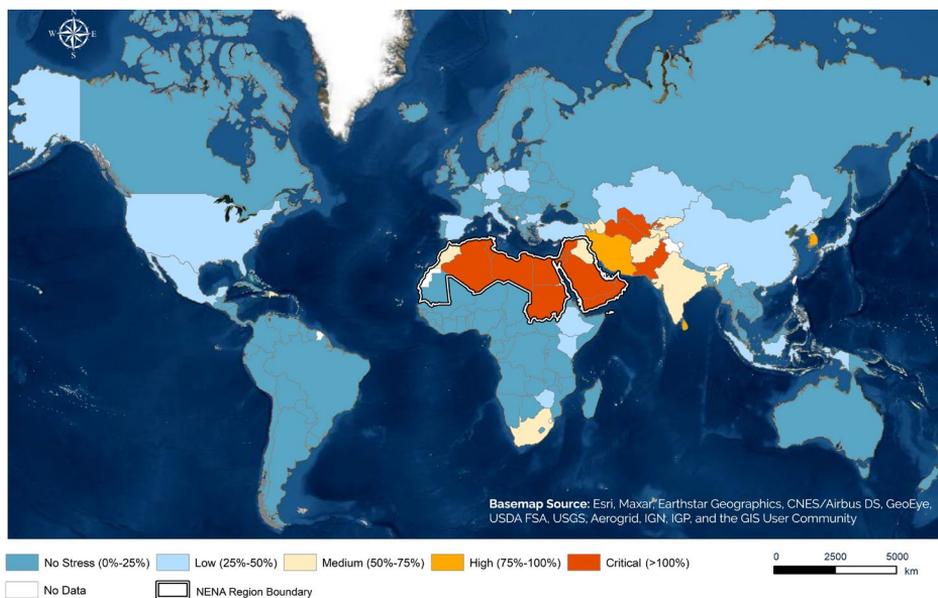
FIGURE 3.1 PAST RECORDS AND FUTURE PROJECTIONS OF RENEWABLE WATER AVAILABILITY PER CAPITA*



Source: United Nations, Department of Economic and Social Affairs (UNDESA) Population Division. 2019. *World Population Prospects 2019, online edition*. Cited 13 April 2021. <https://population.un.org/wpp/Download/Probabilistic/Population/>

Note: *LDC figure increased between 2007 and 2012 due to the inclusion of Sudan data; projections for 2030 and 2050 assume that water availability remains constant and population projects use the median (50 percent) prediction interval of the Probabilistic Projection of UN Population Division.

FIGURE 3.2 WATER STRESS LEVELS – SDG 6.4.2 (LATEST REPORTING YEAR)

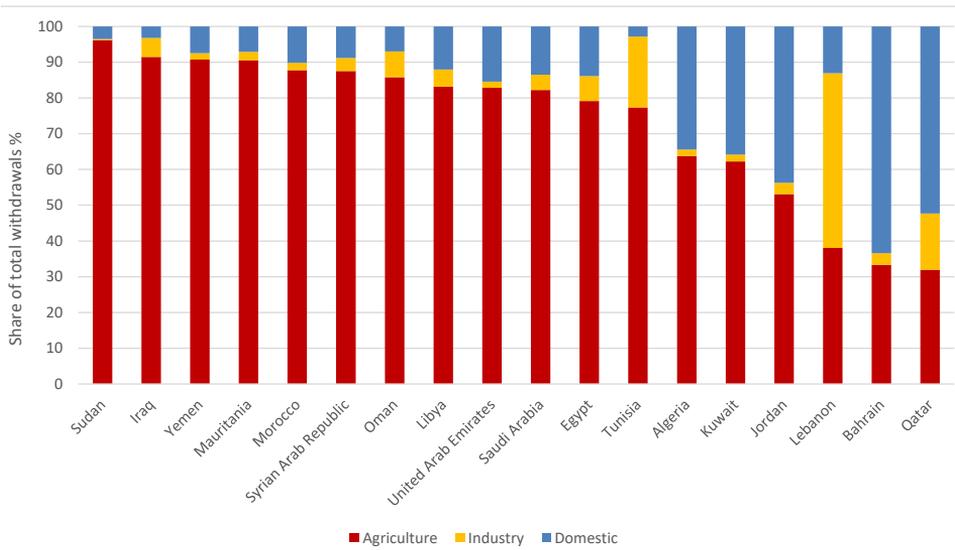


Source: FAO. 2021. AQUASTAT. In: *FAO.org*. Cited April 2021. <http://www.fao.org/aquastat/en/>

Final boundary between the Sudan and South Sudan has not yet been determined.

Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

FIGURE 3.3 WATER WITHDRAWALS BY SECTOR IN NENA COUNTRIES, 2017



Source: FAO. 2017. AQUASTAT. In: *FAO.org*. Cited 05 April 2021. <http://www.fao.org/aquastat/en/>

**PART II:
ELABORATION ON WATER, SOIL,
CLIMATE CHANGE IMPACTS AND
THE URBAN-RURAL INTERFACE**

4

**RESTORING LAND
AND SOIL HEALTH
FOR SUSTAINABLE
AGRICULTURE**

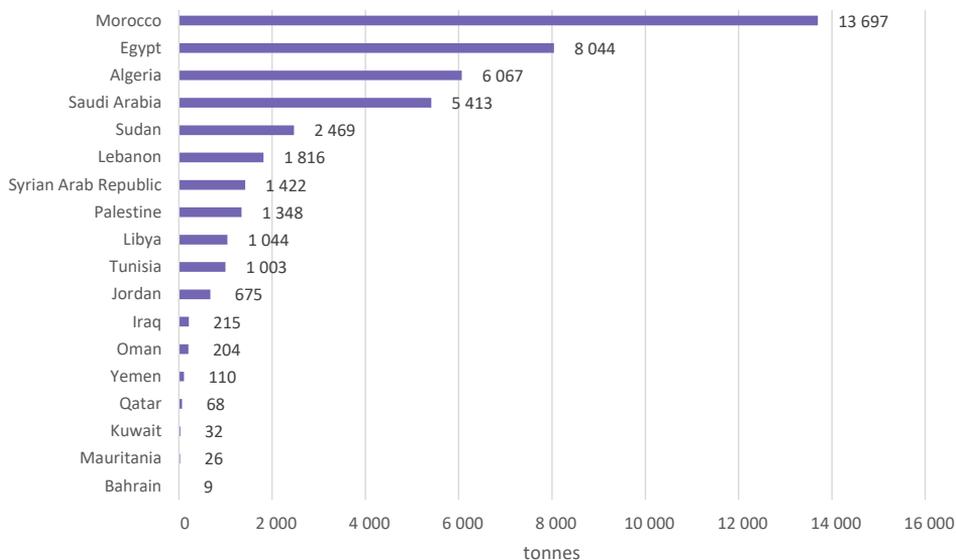


KEY MESSAGES

- ▶ **The estimated cost of land degradation has been valued at USD 9 billion per year in the NENA region** (between 2000 and 2015). Land degradation has reduced the potential productivity of soil by about one-third in recent years.
- ▶ **Degradation of rangelands in the Arab countries has been estimated at 3.3 percent of land area.** Sixteen NENA countries mention forest- and rangeland-related adaptation in their NDCs as measures to address climate change.
- ▶ **Salt-affected soils in the NENA region cover 11.2 percent of total land area.** There is significant variation of salt-affected soils and secondary salinization among NENA countries.
- ▶ **Inappropriate use of agro-chemicals adversely affects soil fertility and water quality in the region.** Six NENA countries are among the world's top 20 countries in terms of fertilizer consumption, expressed in kg/ha of arable land. The region applied more than 43 000 tonnes of pesticides in 2018.
- ▶ **The NENA region is highly prone to sand and dust storms (SDS).** These cause losses of GDP estimated at about USD 13 billion every year. It is estimated that almost 94 million tonnes of dust per year is generated by SDS in the Middle East and that 80 percent of it is deposited within the area.
- ▶ **Some NENA countries do not have sufficient regulatory frameworks for governing land tenure and land-use rights.** Urbanization is increasing in many NENA countries, with cities encroaching on the best soils and impacting agricultural production.
- ▶ **Conflicts have a direct adverse impact on land use and management.** Refugees and IDPs add pressure on the land in the areas where they settle, leading to land degradation and desertification. A recent FAO study covering six conflict-affected countries found strong correlations between conflict densities and the percentage of degraded land.
- ▶ **Fourteen countries in the region have set voluntary targets to achieve land degradation neutrality (LDN) by 2030.** LDN is related to Target 15.3 of the Sustainable Development Goals.
- ▶ **The UN Decade on Ecosystem Restoration (2021–2030) provides a focus for mainstreaming rehabilitation approaches in the NENA region.** An estimated 3.5 million km² of land are potentially suitable for better sustainable land and water management (SLWM) practices (irrigated, rainfed and rangeland agro-ecosystems). The FAO Voluntary Guidelines for Sustainable Soil Management (VGSSM) suggest practices that lead to minimizing soil erosion, enhanced soil organic matter content and soil biodiversity to foster soil nutrient balance and cycles, and improved soil water management.
- ▶ **Digital innovations offer plenty of opportunities for the region.** The use of digitalization, remote sensing data, information technology and knowledge management systems can help to avoid, reduce, restore and monitor soil health. Digital soil information systems are useful for harmonizing soil maps and disseminating good practices in soil management.

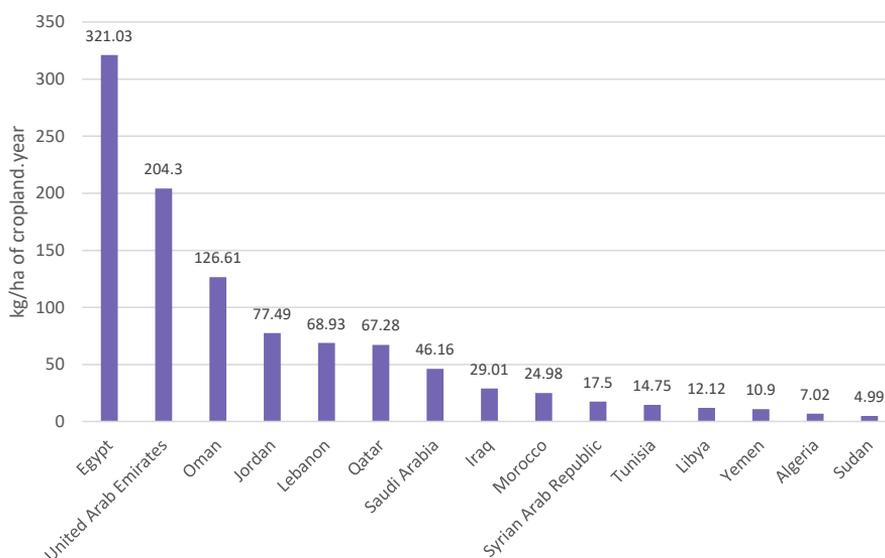
FACTS AND FIGURES

FIGURE 4.1 PESTICIDE USE, NENA, 2018*



Source: FAO.2021. FAOSTAT. Rome. Cited 10 June 2021. <https://www.fao.org/faostat/en/>
 *United Arab Emirates does not have any available data on total pesticide use.

FIGURE 4.2 NITROGEN FERTILIZER USE PER AREA OF CROPLAND, NENA, AVERAGE FOR THE PERIOD 2007–2018



Source: FAO.2021. FAOSTAT. Rome. Cited 10 June 2021. <https://www.fao.org/faostat/en/>



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**PART II:
ELABORATION ON WATER, SOIL,
CLIMATE CHANGE IMPACTS AND
THE URBAN-RURAL INTERFACE**

5

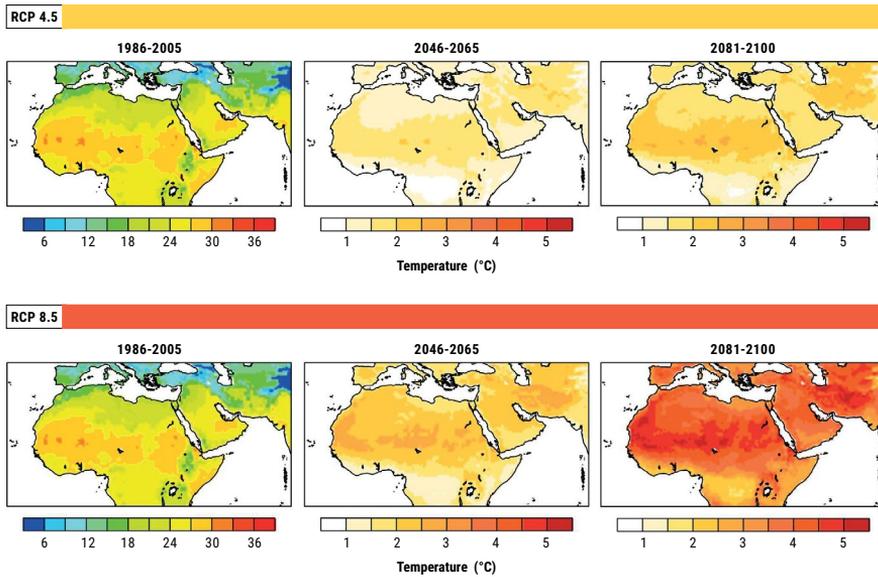
**CLIMATE CHANGE,
LAND, WATER AND
AGRICULTURE: IMPACTS
AND RESPONSES**

KEY MESSAGES

- ▶ **NENA is one of the regions in the world that will be most affected by climate change.** It will experience an average mean temperature increase of 1.7 °C to 2.6 °C under RCP 8.5, with parts of the region seeing a rise of 4.8 °C by 2100 compared with the period 1985–2005. Highest increases in average mean temperature of more than 3 °C are projected for non-coastal areas, including the Sahara Desert.
- ▶ **The increase in floods and droughts is already having serious implications for agricultural yields.** Precipitation is projected to generally decrease across the region, with increased seasonal and annual variability, including an increase in extreme events. Droughts are expected to increase in frequency by 150 percent up to 2070, and flash floods will threaten coastal and low-lying agricultural areas.
- ▶ **Specific areas are particularly vulnerable to water stress. All populated and arable lands are vulnerable to water stress,** but the highest water-induced climate vulnerability areas (including in terms of adaptive capacity) will be the upper Nile Valley, the southwestern Arabian Peninsula and the northern Horn of Africa.
- ▶ **Crop yields are expected to decline.** Due to a decrease in productivity accompanied by a shortage in the length of crop cycles, negative impacts on crop quantity and quality will affect food production. Rainfed farming systems are the most vulnerable.
- ▶ **Smallholders will be hardest hit by climate change, as well as populations living in LDCs and countries under conflict, due to low capacities to adapt.** Higher negative effects are likely despite relatively more moderate increases in temperature. Populations living in situations of protracted conflict are particularly vulnerable.
- ▶ **On- and off-farm diversification is necessary to secure rural livelihoods.** On-farm options include climate-smart agriculture approaches, crop diversification, conservation agriculture, crop rotation, modification of sowing and planting times, and strategies to address degradation of land and water resources.
- ▶ **The Arab Declaration on Climate Change in 2007 spurred a regional response.** Coordinated studies and operational responses to water scarcity are being initiated. Examples include the RICCAR regional Knowledge Hub, the Arab Centre for Climate Change Policies, and the 2019 Cairo Declaration emanating from the first joint meeting of ministers of water and ministers of agriculture in the Arab region.
- ▶ **Climate finance flows to the agriculture,** land-use, forestry and water sectors require much greater attention. Funding is currently insufficient. Although water, salinization and productivity losses are adaptation priorities, funding for water and sanitation and AFOLU sectors is five to seven times lower than for energy, transport, storage, industry and banking/finance.

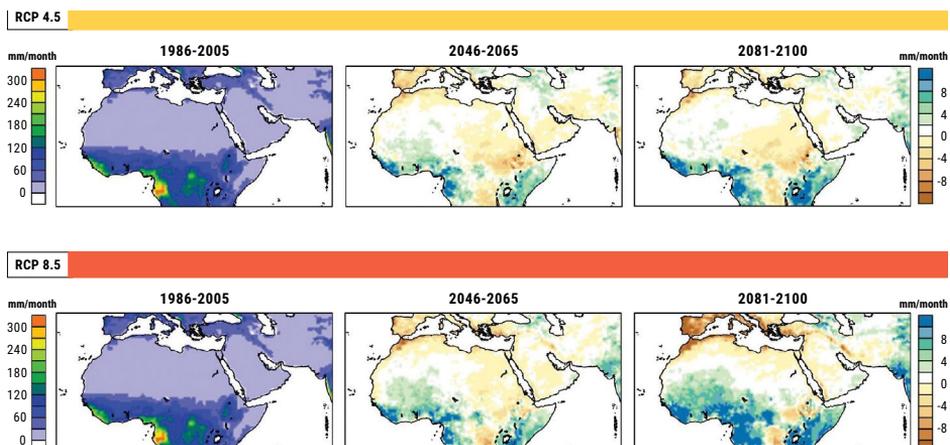
FACTS AND FIGURES

FIGURE 5.1 MEAN CHANGE IN ANNUAL TEMPERATURE (°C) FOR THE FOR MID- AND END-CENTURY FOR AN ENSEMBLE OF THREE RCP 4.5 AND RCP 8.5 PROJECTIONS COMPARED WITH THE REFERENCE PERIOD WITH THE REFERENCE PERIOD



Source: United Nations Economic and Social Commission for Western Asia (ESCWA) et al. 2017. Arab Climate Change Assessment Report – Main Report. Beirut. www.unescwa.org/sites/www.unescwa.org/files/publications/files/riccar-main-report-2017-english_0.pdf

FIGURE 5.2 AVERAGE CHANGE IN ANNUAL PRECIPITATION (MM/MONTH) FOR RCP 4.5 AND RCP 8.5



Source: United Nations Economic and Social Commission for Western Asia (ESCWA) et al. 2017. Arab Climate Change Assessment Report – Main Report. Beirut. www.unescwa.org/sites/www.unescwa.org/files/publications/files/riccar-main-report-2017-english_0.pdf

TABLE 5.1 CHANGE IN YIELDS (%) FOR SELECTED CROPS FOR RCP 4.5 AND RCP 8.5 UNDER CHANGING AND FIXED CO₂ CONCENTRATIONS

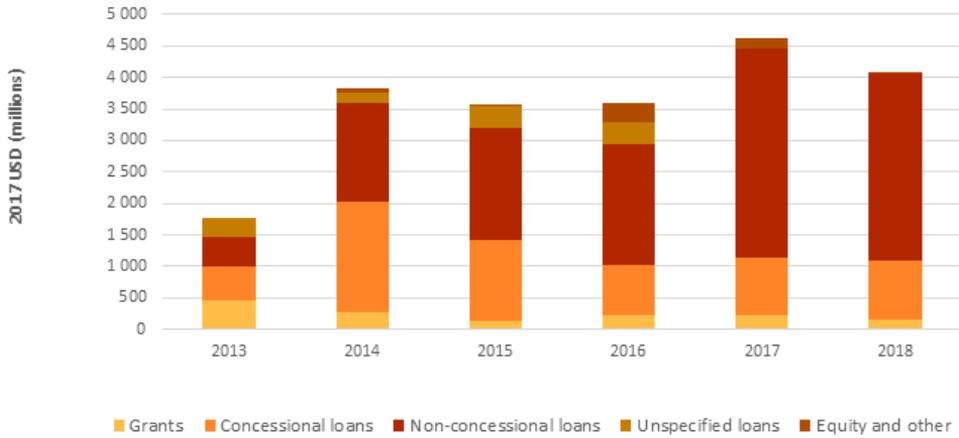
Country (district) and crop	Percentage change in yield							
	2020–2030		2040–2050		2020–2030		2040–2050	
	RCP 4.5 with fixed CO ₂	RCP 4.5 with changing CO ₂	RCP 4.5 with fixed CO ₂	RCP 4.5 with changing CO ₂	RCP 8.5 with fixed CO ₂	RCP 8.5 with changing CO ₂	RCP 8.5 with fixed CO ₂	RCP 8.5 with changing CO ₂
Rainfed crops								
Morocco (Marchouch) – Wheat	-23.0	-13.2	-18.0	-1.6	-9.0	-1.9	-26	2.4
Sudan (Gadari) – Sorghum	-0.7	-2	-7.0	-8.0	-7	-5	-11	-8.0
Tunisia (Koudiat) – Wheat	-7.0	5.7	-2.8	17.4	-4.4	4.2	0.2	13.9
Jordan (Madaba) – Wheat	33.77	32.1	48.26	36.5	53.53	42.4	81.59	73.9
Yemen (Dhamar) – Sorghum	-26.4	-21.6	-29.8	-24.3	-31	2.64	-10.3	-2.47
Palestine (Jenin) – Wheat	17.8	20.0	30.0	24.0	33.8	38.5	56.2	54.7
Irrigated Crops								
Egypt (Sakha) – Wheat	-1.7	10.3	-3.9	13.2	-2.9	10.1	-5.7	12.5
Iraq (Al Suwaira) – Tomato	-1.2	11.6	-5.3	12.8	-6.2	6.7	-7.0	11.9

Country (district) and crop	Percentage change in yield							
	2020–2030		2040–2050		2020–2030		2040–2050	
	RCP 4.5 with fixed CO ₂	RCP 4.5 with changing CO ₂	RCP 4.5 with fixed CO ₂	RCP 4.5 with changing CO ₂	RCP 8.5 with fixed CO ₂	RCP 8.5 with changing CO ₂	RCP 8.5 with fixed CO ₂	RCP 8.5 with changing CO ₂
Yemen (Sana'a) – Wheat	-4.2	8.3	-6.1	12.6	-3.81	13.1	-7.6	10.2
Lebanon (central Beqaa Valley) – Wheat	8.3	22.5	13.4	35.8	10.2	26.1	17.4	42.2

Source: Aquacrop simulations using RICCAR projections.³ RICCAR regional Knowledge Hub [online]. Cited 15 December 2021. www.riccar.org; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019a. *Assessing the impact of changes in available water on productivity of agricultural crops*, Morocco case study report, Beirut, 19-00115. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-moroccoarabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019b. *Assessing the impact of changes in available water on productivity of agricultural crops*, Sudan case study report, Beirut, 19-00116. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-sudan-arabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019c. *Assessing the impact of changes in available water on productivity of agricultural crops*, Tunisia case study report, Beirut, 19-00222. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-tunisia-arabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019d. *Assessing the impact of changes in available water on productivity of agricultural crops*, Jordan case study report, Beirut, 19-00082. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-jordan-arabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019e. *Assessing the impact of changes in available water on productivity of agricultural crops*, Yemen case study report, Beirut, 19-00082. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-yemenarabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019f. *Assessing the impact of changes in available water on productivity of agricultural crops*, Palestine case study report, Beirut, 19-00082. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-reportpalestine-arabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019g. *Assessing the impact of changes in available water on productivity of agricultural crops*, Egypt case study report, Beirut, 19-00096. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-egypt-arabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019h. *Assessing the impact of changes in available water on productivity of agricultural crops*, Iraq case study report, Beirut, 19-00127. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-iraq-arabic.pdf; **United Nations Economic and Social Commission for Western Asia (ESCWA)**. 2019i. *Assessing the impact of changes in available water on productivity of agricultural crops*, Lebanon case study report, Beirut, 19-00097. www.unescwa.org/sites/www.unescwa.org/files/uploads/national-assessment-report-lebanonarabic.pdf.

³ Country reports are available in English on the following website: <https://www.unescwa.org/publications/climate-resilient-agriculturetranslating-data-policy-actions>

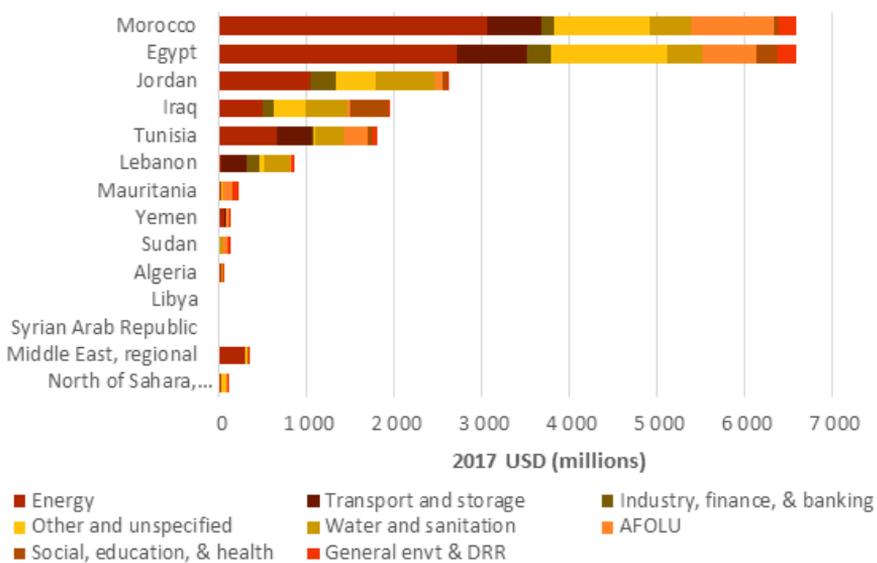
FIGURE 5.3 PUBLIC INTERNATIONAL CLIMATE FINANCE COMMITMENTS TO NENA BY TYPE OF FINANCIAL INSTRUMENT



Source: Prepared by ESCWA based on OECD. *Climate-related development finance data, database* [online]. Cited 15 December 2021. www.oecd.org/dac/financing-sustainable-development/development-finance-topics/Climate-related-development-finance-in-2018.pdf

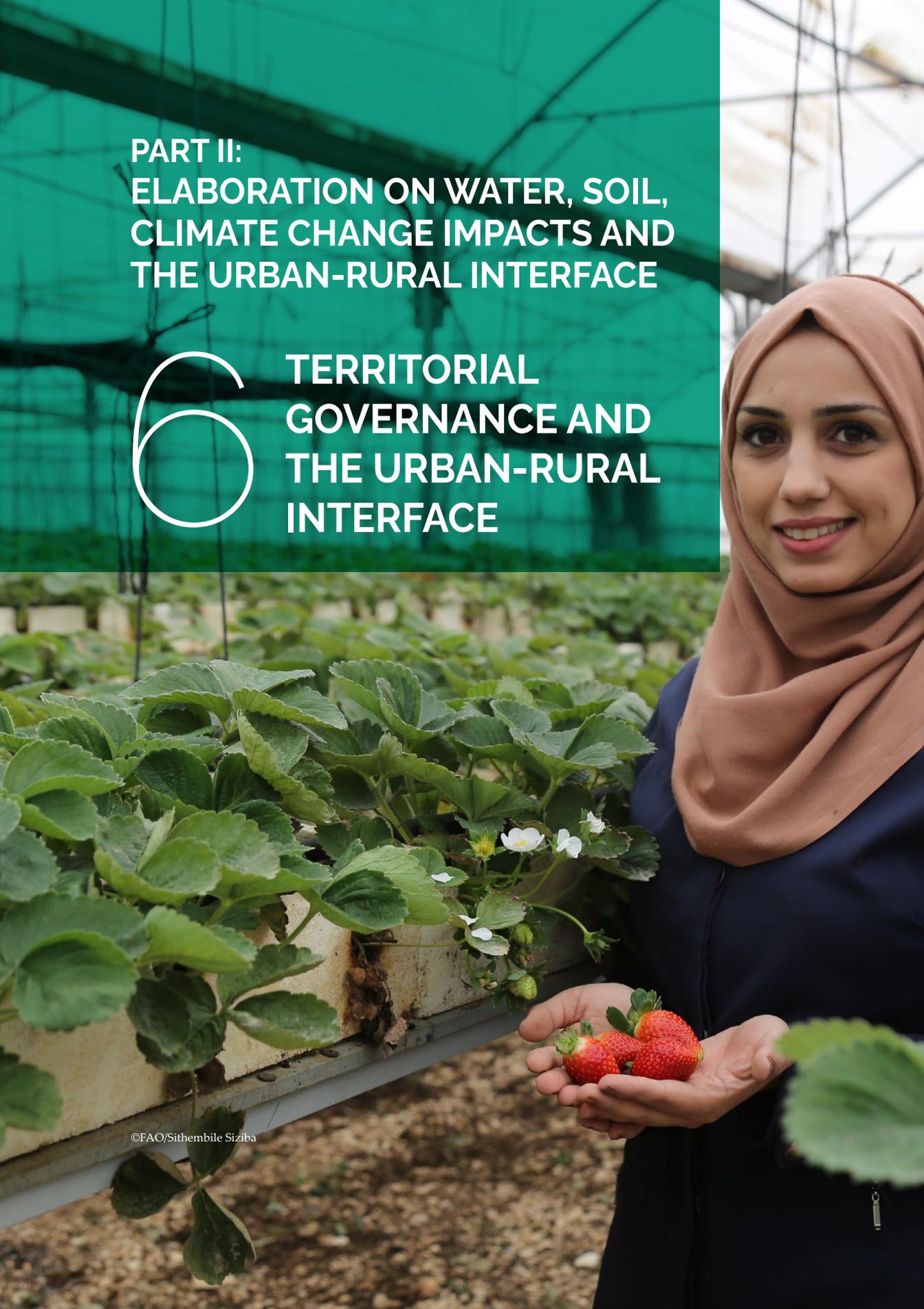
Note: This chart evaluates bilateral and multilateral climate finance commitments to the NENA region based on reporting to the OECD. It includes commitments with climate marked as a 'principle' objective (Rio Tag). It also includes 'climate components' reported by multilateral development banks. Flows with climate marked as a 'significant' objective (Rio Tag) are not included.

FIGURE 5.4 PUBLIC INTERNATIONAL CLIMATE FINANCE FLOWS TO THE NENA REGION BY SECTOR AND RECIPIENT (2013–2018)



Source: Prepared by ESCWA based on OECD. *Climate-related development finance data, database* [online]. Cited 15 December 2021. www.oecd.org/dac/financing-sustainable-development/development-finance-topics/Climate-related-development-finance-in-2018.pdf

Note: This chart evaluates bilateral and multilateral climate finance flows to the NENA region based on reporting to the OECD. It includes flows with climate marked as a principal objective (Rio Tag). It also includes 'climate components' reported by multilateral development banks. Flows with climate marked as a significant objective (Rio Tag) are not included.

A woman wearing a brown hijab and a dark blue top is smiling and holding several ripe red strawberries in her hands. She is standing in a greenhouse with rows of strawberry plants in white trays. The background is a green mesh structure.

**PART II:
ELABORATION ON WATER, SOIL,
CLIMATE CHANGE IMPACTS AND
THE URBAN-RURAL INTERFACE**

6

**TERRITORIAL
GOVERNANCE AND
THE URBAN-RURAL
INTERFACE**

KEY MESSAGES

- ▶ **Urbanization is a growing phenomenon in NENA.** The number of people living in urban areas rose from around 146 million to 250 million in the past 20 years. Although currently at almost 60 percent, the urban population is projected to grow to almost three-quarters of the rural population by 2050.
- ▶ **Peri-urban and rural farmlands are under constant pressure from urbanization and degradation.** Infrastructure development is often at the expense of agricultural land, leading to land fragmentation.
- ▶ **Making available food and water resources for a growing urban population is a challenge.** With limited land and water resources, and to avoid being over-reliant on food imports, agrifood systems will have to transform and adapt, addressing food security, climate change and natural resource scarcity. Without action, water availability, including the quality and quantity, will further deteriorate, severely affecting the resilience of urban communities.
- ▶ **Urban waste is often not properly collected and treated, resulting in pollution.** Landfill for waste results in loss of resources that could be recycled. Eleven percent of food was lost or wasted in 2016 in the region. Wastewater recycling, although practised by several countries, is low overall. A circular economy model aims to keep products, materials, equipment and infrastructure in use for longer periods.
- ▶ **Cities should reconnect with their rural territories, ensuring supply and demand for locally supplied fresh foods.** Efficient urban-rural linkages are important for inclusive and resilient territorial development. Urban agriculture also facilitates shorter supply chains.
- ▶ **Digital technologies can facilitate connections between rural and urban areas and help smallholder farmers to better access local markets.** Use of transformation and innovative digital technologies improved during the COVID-19 pandemic, but can be better directed at zero percent waste and carbon neutrality.
- ▶ **Greener cities improve the quality of life and standard of living.** Multiple environmental benefits such as flood control, reduction of stormwater runoff and soil sealing, as well as biodiversity, are benefits of green planning in cities. Green infrastructure and urban agriculture can be integrated in planning.
- ▶ **Land and water management must be more effectively integrated within city watersheds.** A functional multilevel governance system is ideally required for territorial governance. Accurate data, more effective, inclusive and participatory planning mechanisms, along with tenure policies, are important inputs for better decision-making and planning. The restoration of existing natural resources while leaving no one behind is the ultimate goal.

FACTS AND FIGURES

TABLE 6.1 POPULATION GROWTH 2000–2020

	2000	2010	2020	% growth 2000–2010	% growth 2010–2020	% growth 2000–2020
Urban population	146 499 777	195 382 586	252 185 468	33%	29%	72%
Rural population	127 361 675	147 787 988	168 738 943	16%	14%	33%
Total population	273 861 452	343 170 574	420 924 411	25%	23%	54%

Adapted from source: UNDESA 2018 revision, online edition, 2021.

Note: The growth rates are calculated as simple percentage changes between the ending and the beginning years.

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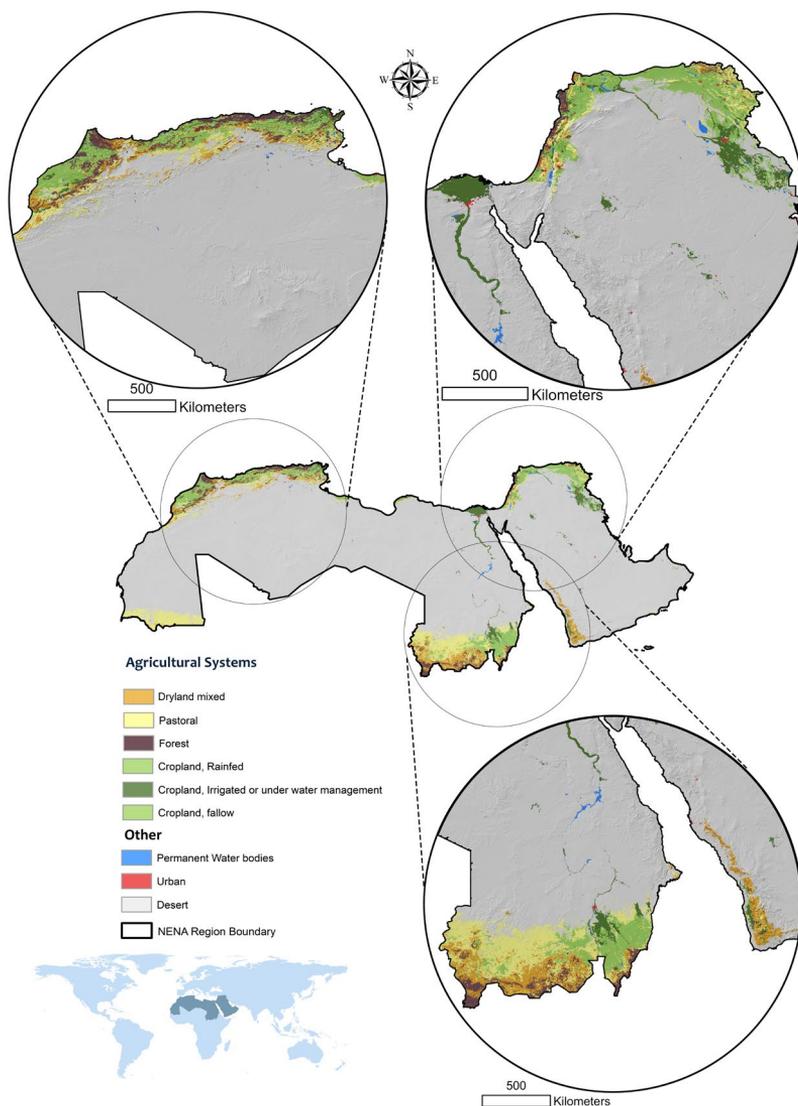
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ANNEXES

FIGURE A.1 AGRICULTURAL SYSTEMS IN THE NENA REGION

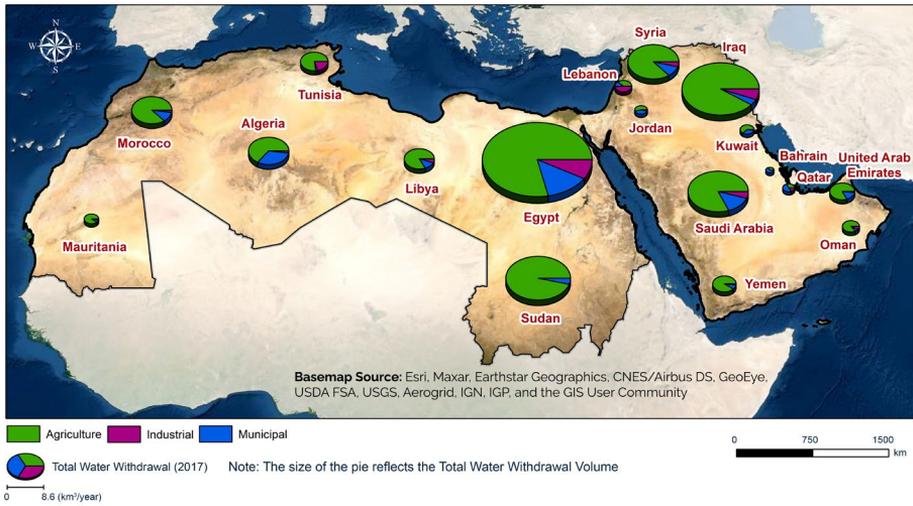


Basemap Source: Esri, Maxar, Earthstar Geographics, CNES/Airbus DS, GeoEye, USDA FSA, USGS, AeroGRID, IGN, IGP, and the GIS User Community

Source: Based on FAO WaPOR. FAO's portal to monitor Water Productivity through Open access of Remotely sensed derived data [online]. Rome. [Cited 15 December 2021] https://wapor.apps.fao.org/catalog/WAPOR_2/1/L1_LCC_A

Final boundary between the Sudan and South Sudan has not yet been determined.

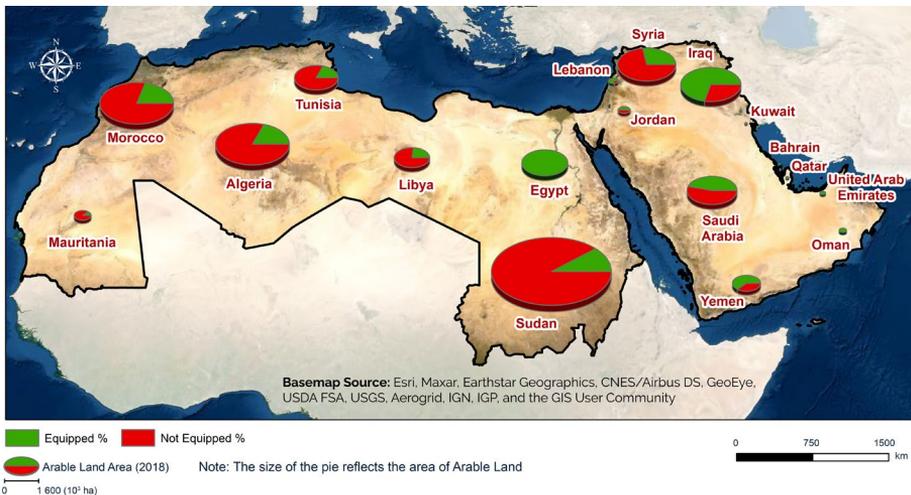
FIGURE A.2 PERCENTAGE OF VOLUME OF WATER WITHDRAWAL BY SECTOR FOR THE PERIOD 2013–2017*



Source: FAO, 2021. AQUASTAT. In: *FAO.org*. Cited April 2021. <http://www.fao.org/aquastat/en/>

Final boundary between the Sudan and South Sudan has not yet been determined.

FIGURE A.3 PERCENTAGE OF VOLUME OF WATER WITHDRAWAL BY SECTOR FOR THE PERIOD 2013–2017*



Source: FAOSTAT, 2021. Rome. Cited July 2021. <https://www.fao.org/faostat/en/#data/RL>

Final boundary between the Sudan and South Sudan has not yet been determined.

The designations employed and the presentation of material in the map(s) do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

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in the Near East and North Africa region

Summary report

FAO Regional Office for the Near East and North Africa
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Food and Agriculture Organization of the United Nations
Cairo, Egypt

ISBN 978-92-5-136694-3



9 789251 366943

CC1173EN/1/10.22

