Food and Agriculture Organization of the United Nations

WORLD BANK GROUP

WATER MANAGEMENT IN FRAGILE SYSTEMS

BUILDING RESILIENCE TO SHOCKS AND PROTRACTED CRISES IN THE MIDDLE EAST AND NORTH AFRICA

Discussion Paper

Regional Initiative on Water Scarcity for the Near East and North Africa

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Cover and back cover photo
The well that is used by farmers during the rainy season to water the farms in the targeted area supported by FAO.

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FOREWORD

The Middle East and North Africa region has always coped with water scarcity. The world's oldest civilizations have managed to develop and prosper in its arid landscapes. Today the region is at a crossroads. Conflict is taking a severe human and economic toll, fueling massive displacements of populations. What water remains available is dwindling, under pressure from rapid population growth and urbanization combined with climate change. Existing water management systems, already plagued by weak governance, limited resources, and degraded infrastructure, are now failing when they are needed the most.

The resilience of people and communities across the region is being tested in unprecedented ways. It is an unfortunate fact that many of the most fragile contexts in the region are also those with the greatest water-related challenges. People caught in conflict, youth and smallholder farmers in particular, are least able to cope with the impact of water shortages and other water-related disruptions.

This paper is part of an ongoing collaboration between the World Bank and the United Nations' Food and Agriculture Organization to raise awareness about the importance of water management in fragile systems and to propose strategic responses. It is important to better understand these dynamics to ensure that water does not add to fragility, but rather promotes stability, and contributes to resilience in the region. This paper calls for redoubling efforts towards sustainable and efficient management of water resources, reliable and affordable delivery of water services to all and protection from water-related catastrophes.

A Palestinian herdsman watering his donkey at a rehabilitated cistern.
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Water security in the region requires going beyond increasing immediate water supplies to a focus on ensuring sustainable resource management, and efficient and affordable service delivery. Such a balanced approach fortifies the ability to withstand shocks and protracted crisis, such as drought, conflict, or a refugee influx, while also addressing immediate needs such as food security. A regional collaborative approach is necessary, as surface and groundwater resources often cross national borders.

As this paper illustrates, urgent action is needed - precisely when it is most difficult to do so - to prevent water insecurity from adding to the devastating consequences of conflict. This means working with a range of partners on the ground to restore basic access to water and sanitation services during and immediately following humanitarian crises. And the public sector cannot carry this burden alone; private sector solutions should be sought in most cases to durably improve services and free up scarce public financing. As conflict subsides, this will be critical to transition to irrigation modernization, sustainable groundwater management, or wastewater recycling, and introduce more efficient market-based approaches, which can foster both resilience and job creation.

This paper is a first step in the shared goal of our organizations to promote sustainable, efficient, and equitable water management in fragile systems, which we believe can contribute to peace and stability, and prosperity.

Abdessalam Ould Ahmed
Assistant Director-General
Food and Agriculture Organization

Hafez Ghanem
Vice President
Middle East and North Africa Region
World Bank

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Farming families collect drinking water for their households and also for their livestock.
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EXECUTIVE SUMMARY

WHAT IS THIS PAPER ABOUT?

Fragility has become the reality in several countries of the Middle East and North Africa. Armed conflict and forced displacement are taking an enormous toll on human lives, with the region accounting for about 60 percent of the estimated global total of battle-related casualties since the turn of the millennium. Conflicts and fragility have also had negative economic impacts, with countries directly affected by conflict such as Syria and Yemen losing as much as half of their pre-war GDP. Fragility also has spillover economic effects on countries not directly affected by conflict, such as Jordan and Lebanon, where GDP growth slowed following the onset of the Syrian conflict. Several countries not directly affected by armed conflict or forced displacement are undergoing political transitions, which has implications for development and stability.

Fragility challenges compound the region's water problems. Even before the recent political turmoil, several countries in the Middle East and North Africa were struggling to manage their water resources sustainably and efficiently and to expand coverage of water supply and sanitation services. Now conflict has combined with weak institutional performance and contributed to an intensification of water challenges and a deterioration of water services.

This paper brings together these two issues – water and fragility – to discuss how they are related and how they should be addressed. It describes how institutional failures to address water-related challenges can act as risk multipliers, compounding existing situations of fragility, and how improving water management can contribute to building resilience in the face of protracted crises. This paper also emphasises the importance of addressing water and fragility crises in the context of the Sustainable Development Goals.

THE VICIOUS CYCLE OF WATER AND FRAGILITY

The Middle East and North Africa water challenges are intensifying. Rising demands, climate change, inter-sectoral competition and urbanisation are exacerbating the region's age-old water scarcity challenges. To varying degrees in some countries of the region, poorly adapted governance structures and distorted incentives mean these challenges are largely left unaddressed and that actions and policies are not sustained. Distortions in policies and institutions have created a system that does not signal the scarcity value of water. They have in some cases encouraged over-exploitation of resources by failing to implement incentives to curb water consumption and promote conservation.

The scale of the challenge is unprecedented. Countries in the Middle East and North Africa have been at the forefront in developing practices and institutions to manage scarce water resources in the context of a largely arid and highly variable climate. However, the scale of the

current water crisis is unprecedented and requires coordinated responses across institutions in many locations. The scale of the challenge means that state institutions have a fundamental role to play in addressing the region's water crisis. If these entities and their policies fail, then this could contribute to instability in the region.

Failure to find solutions to water challenges aggravates fragility. Water crises strain the ability of individuals and societies to maintain livelihood security and political stability. Water-related issues also severely challenge ecosystems, sometimes leading to irreversible damage if left unaddressed. When water-related challenges negatively impact populations, they can fuel perceptions of institutions not doing enough, exacerbating existing grievance and tensions. Water crises can aggravate existing fragilities, compounding socio-economic risks related to poor governance and marginalisation, and triggering social friction, unrest, migration and violent conflict.

Fragility makes it harder to address water issues. Fragile situations characterised by weak and ineffective institutions, histories of conflict, unsustainable livelihood systems and decaying or damaged infrastructure. These and other factors related to fragility compound challenges to sustainable water management making it more difficult, for example, to provide water services successfully and equitably for household and productive uses. In turn, this intensifies the risk that water challenges will contribute to fragility.

The compounding nature of water and fragility gives rise to a vicious cycle. In this vicious cycle, fragility makes it more difficult for water management to be effective, in turn amplifying the negative political, social and environmental consequences of water-related challenges. At the same time, as water issues are left unaddressed, their impact increases, eroding government legitimacy and destabilising fragile contexts. In some parts of the region, water scarcity and governance challenges interact with situations of armed conflict and political instability to give rise to this vicious cycle.

Don't blame the drought. This paper does not claim that there are direct causal linkages between water crises, social tensions and unrest, migration, or other manifestations of fragility. Drivers of fragility involve a range of factors that interact in complex and often unpredictable ways. Institutions and policy choices mediate water-related impacts on people and economies. Water-related challenges can amplify fragility risks when policy design and implementation do not adequately promote sustainability, inclusion and resilience.

WHAT CAN BE DONE?

Addressing water and fragility challenges requires a move from a focus primarily on immediate, reactive responses to a balanced long-term approach. This approach would build growth-oriented resilience to shocks and protracted crises focused on sustainable, efficient and equitable water resources management and service delivery. Today's water management choices will influence what the economic and stability prospects for the region could be in the future. Sustainable and efficient management of water resources, inclusive delivery of water services, and rapid and equitable protection from water-related disasters can prevent

water challenges from acting as risk multipliers. This paper highlights potential options for improved water management to contribute to resilience and stability in the region.

Use decentralised, participatory approaches. Interventions need to be local, inclusive, consultative and bottom up. Because of the essentially local nature of the water and agriculture problems and intervention responses, community consultation, participation and ownership are vital, as is working with whatever local government may exist on the ground. While leadership and ownership are important at all levels, these approaches are particularly valuable in fragile and conflict-affected situations, because they combine approaches to solving the water problem with building the kind of cooperation and dialogue between the state and civil society that is a key characteristic of more stable, higher governance states.

Invest in innovative policies and practices. Research, technology development and transfer can provide further improvements to water efficiency and crop productivity in the region. It can also greatly increase the resilience of rainfed agricultural systems, for instance by promoting land conservation and reclamation practices.

Working together within countries and across boundaries is essential. Given the scale and commonality of the challenges, the relatively small size of many MENA countries and the transboundary nature of important issues like climate change and shared water resources, collective action and partnerships are essential. Countries affected by fragility and conflict can progressively adapt and adopt technologies and use cooperation on technology as a way of re-establishing or repositioning themselves and building relationships in regional and international communities.

BUILDING RESILIENCE: WATER MANAGEMENT TO PROMOTE PEACE AND STABILITY

Water management is conducive to stability and peacebuilding. Water and agriculture are key to recovery and stabilisation and – ultimately – to peacebuilding. Water management offers the opportunity to empower communities and, more broadly, to develop inclusive institutions for responsible and transparent delivery of the resource. Sharing information and getting users involved creates ownership and common purpose providing the opportunity for peace and stability. This focus on supporting institutions for shared water management is central to recovery in the region, especially in rural areas. These areas are home to a large proportion of the population of the conflict-affected countries. They are the breadbasket, a reserve of peace and a haven of refuge in troubled times. Rural areas have a prime role in helping populations weather the crises in the region and to emerge from them. Producing and selling food, generating rural incomes and employment, rebuilding household-level food security, supplying drinking water, and rebuilding social cohesion and institutions from the bottom up, are key to stabilisation and ultimately to peacebuilding. At the regional level, cooperation over shared transboundary rivers and aquifers also offers an opportunity to promote peace and stability.

Addressing short-term livelihood and food security needs is essential in the short-term. From the outset, all interventions need to have an eye on building long-term resilience. Building resilience in water and agricultural systems in fragile and conflict-affected situations requires both the short-term and the long-term to be considered in planning from the very beginning, thus bridging the divide between humanitarian and development efforts. The challenge is to address the longer-term issues, like water resource sustainability, while also considering immediate livelihoods and food security challenges.

Sustainable water management is necessary for the long-term. During and immediately after conflict, interventions need to target water delivery services and ways to improve food security. One possible way to improve food security is by supporting smallholder crop and livestock production. Working with the private sector to restore basic access to water and sanitation to satisfy basic human needs and agricultural demands is a necessity. As conflict subsides and development opportunities materialise, promoting sustainable livelihoods and employment opportunities becomes necessary. Finally, implementation of sustainable water resources management practices should occur during the restoration of institutions and infrastructure. Beyond the near-term objective of restoring water infrastructure – for example, rehabilitating canals and irrigation schemes or strengthening dams – longer-term aims in water management are important. These include decentralisation and modernisation of irrigation, sustainable and more equitable use of groundwater, maximisation of crop or dollar per drop of water through efficiency gains along the whole value chain, and the inclusion of women in decisions on natural resources. All these changes need to be underpinned by strengthened capacity and institutions.

CHAPTER 1

Fragility in the Middle East and North Africa: A Global Challenge

1.1 INTRODUCTION

Fragility has become the reality in several countries of the Middle East and North Africa.[1] While the conflict in Syria and Yemen and the ensuing humanitarian crises have captured headlines around the world, they are only part of a much broader fragility story unfolding across the region. The fragility challenge has many dimensions including armed conflict, migration, economic and political instability, an eroding social contract and natural resources pressures. **Armed conflict in four countries in the Middle East and North Africa is taking an enormous toll on human lives, physical infrastructure and economies.** Syria, Yemen, Iraq and Libya are all experiencing armed conflict at the time of writing. Other countries in the region are exposed to the spillover effects of conflict and violence in neighbouring countries, and to emerging threats from terrorism. Terrorism incidents in the past three years in the Middle East and North Africa have more than doubled, and so have casualties related to terrorism.[2] **Millions of people have fled their homes because of armed conflict and violence.** The largest movement of refugees and internally displaced persons (IDPs) in the world is taking place in the Middle East and North Africa. Most people have fled to environmentally and economically fragile countries within and outside the region, giving rise to the biggest refugee crisis since World War II. Refugees fleeing areas experiencing armed conflict have fled to Turkey, Lebanon, Jordan, Tunisia and Djibouti among others (figure 1.1). Some 1.7 million refugees from the Middle East and North Africa have reached Europe since 2014 (UNHCR, 2016).

Countries in the Middle East and North Africa host a very large number of refugees. The scale of this challenge is shown in figure 1.2, which compares the number of refugees to the national population of host countries. Of the top ten countries, four are countries in the Middle East and

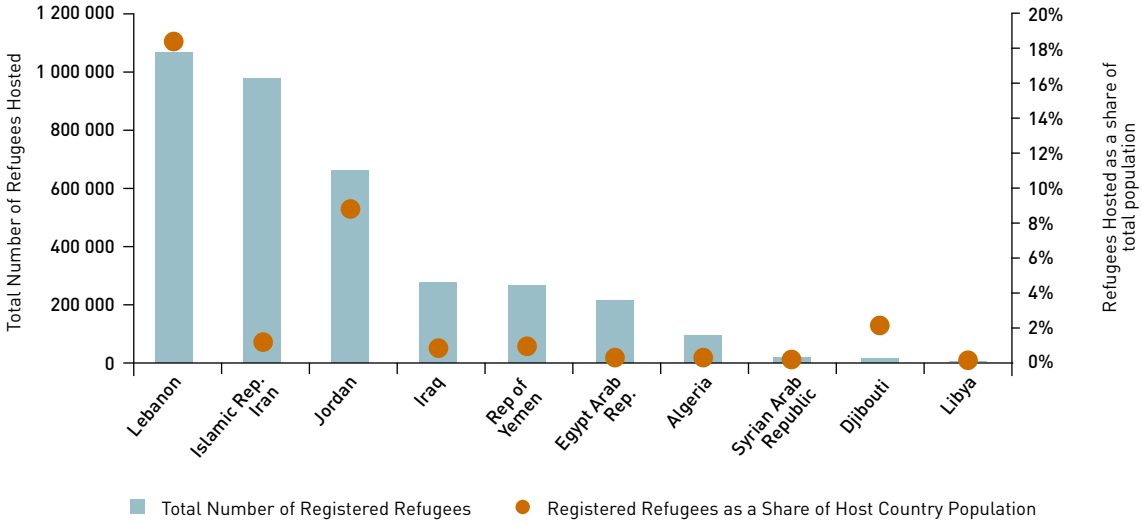
[1] This report uses the World Bank classification of the Middle East and North Africa Region, which includes the countries and economies as follows: Algeria, Bahrain, Djibouti, the Arab Republic of Egypt, the Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, the Syrian Arab Republic, Tunisia, the United Arab Emirates, the Republic of Yemen, and West Bank and Gaza. This differs from the FAO classification of the Near East and North Africa Region which includes: Algeria, Bahrain, Arab Republic of Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates and Rep. of Yemen.

[2] Data from the Global Terrorism Database.

North Africa. In Lebanon, nearly one in five individuals is a refugee and in Jordan about one in ten (UNHCR 2016). In absolute terms, the top refugee-hosting countries in the Middle East and North Africa are Lebanon and the Islamic Republic of Iran, which each host about 1 million refugees. Jordan is third with about 700 000 refugees registered with UNHCR (UNHCR, 2016). Turkey hosts the largest number of refugees from the Middle East and North Africa. Government estimates suggest that Turkey hosts more than 2.5 million registered refugees, mostly from Syria.

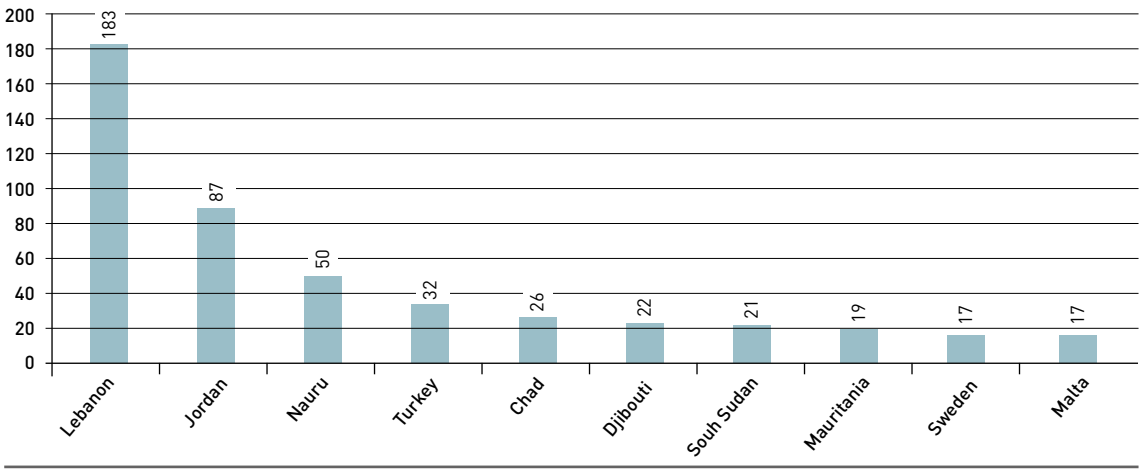
The large number of displaced people is threatening the economic, political, and environmental resilience of countries in the Middle East and North Africa. Large-scale population movement poses significant challenges for water and food security for both hosting and displaced communities.

Figure 1.1 **Top ten countries in the Middle East and North Africa for number of refugees hosted**



Source: World Bank with data from UNHCR, 2016. Data includes Palestinian refugees in Jordan, Lebanon and Syria.

Figure 1.2 **Top ten countries in the world for number of refugees per 1000 inhabitants**



Source: UNHCR (2016)

These challenges are likely to continue for some years: the average length of refugee crises globally is estimated to be about 25 years (UNHCR, 2016). Surveys of Syrian refugees and IDPs show that up to a quarter of them do not plan to return to their homes (Devarajan, 2015). Even if armed conflict were to end immediately, the scale of the fragility challenge requires long-term development responses alongside humanitarian interventions.

Women and children are especially affected by conflict and forced displacement. More than half of the refugee population is made up of women and children who are more vulnerable to the effects of violence during and following conflict. Women are subject to particular protection problems, as traditional protection networks have broken down, increasing their vulnerability to sexual and gender-based violence (UNHCR, 2014). In the Republic of Yemen, where half of the population is under age 19, children account for the largest proportion of the displaced population (UNHCR, 2016).

The fragility crisis in the Middle East and North Africa is having massive and persistent economic costs. Conflicts in Iraq, Syria, Yemen and Libya have caused deep recession and worsened fiscal and economic positions (Rother *et al.*, 2016). Macroeconomic impacts of conflicts caused losses of a third of national gross domestic product (GDP) or more in Syria. In situations of protracted crisis, such as in the West Bank and Gaza, economic development can stagnate for over 20 years (Devarajan 2015). Some estimates suggest that the Syrian refugee crisis is lowering GDP growth rates in Lebanon by 2.6 percent a year and by 1.8–2.6 percent in Jordan (Rother *et al.*, 2016). Conflict has also reversed some of the region's Millennium Development Goal (MDG) gains and seriously challenges progress toward the Sustainable Development Goals (SDGs) (OECD, 2015).

Several countries in the Middle East and North Africa not directly affected by armed conflict or forced displacement are undergoing political transitions, which has implications for development strategies. Following the socio-political changes across the region which started in Tunisia in 2010, many countries in the Middle East and North Africa experienced political change, often in environments where political institutions were not well developed. Some of the political movements that gained power were unable to gain widespread support or gave rise to sectarian tensions. Furthermore, as several authoritarian governments responded to citizens' demands and protests with violence, trust in state institutions in those countries declined. On top of this political turmoil, many countries in the Middle East and North Africa are facing changing economic conditions due to low oil prices which affects not only oil exporters but also the many countries which depend on remittances from migrant workers in the oil-exporting states. Lower growth and a more difficult fiscal situation have led some governments to cut back on social expenditures, and this has contributed to a decline in citizens' trust in state institutions. In several countries, security concerns have come to prevail over sustainable development concerns. As a result, several states have deferred action on longer-term issues such as water resources and environmental management and have reduced investment in water-related infrastructure and services.

Weak relationships between citizens and state institutions add to the region's fragility challenge. Surveys of citizens in the region show widespread discontent toward governments, which are perceived to perform poorly in key policy areas including ensuring sustainable,

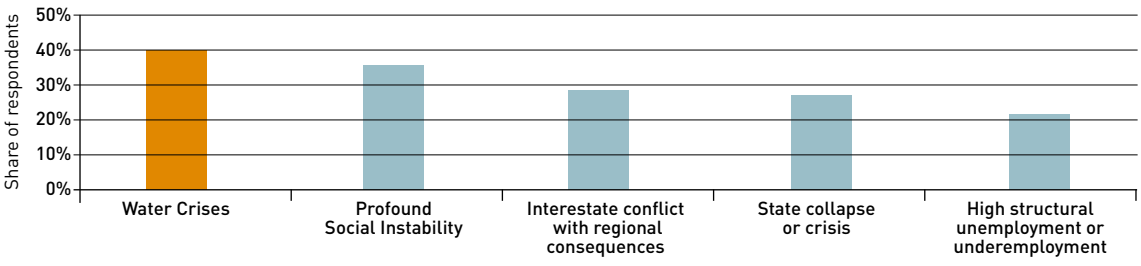
efficient, and equitable provision of water and food.[3] Global experience shows that where high levels of discontent and distrust persist, this can foster instability. When state institutions fail to deliver basic services and are perceived to lack accountability and transparency, grievance toward the government increases. Several countries in the Middle East and North Africa appear to be on this trajectory. The impacts of fragility extend beyond country and regional borders and are not limited to state institutions. Spillover effects can have global implications. The effects of armed conflict and large-scale forced migration have had political, social, and economic repercussions across Europe, the Americas, and Asia. Fragility is also not limited to state institutions (as exemplified by the 'fragile states' concept), but it results from an accumulation and combination of risk factors. This view of fragility recognises that a combination of risk factors, such as heightened risk of conflict, grievances, violence, and chronic underdevelopment, can lead to fragility even in situations where state institutions might otherwise have adequate capacity to deliver services and cope with stress.

1.2 WATER, FRAGILITY AND PROGRESS TOWARD SUSTAINABLE DEVELOPMENT

Water crises are the top challenge that the Middle East and North Africa is least ready to face according to the World Economic Forum. Leaders from the public, private, and not-for-profit sectors surveyed by the World Economic Forum identified the main risks the region is least prepared to face (WEF, 2015). Water crises were identified as the top risk, followed by profound social instability, state collapse, and interstate conflict (figure 1.3). These latter three risks are all related to situations of fragility. The World Economic Forum survey data confirms the scale of the challenge and identifies water crises and fragility as existential threats to the prosperity and well-being of millions of people living in the region.

The water crisis in the Middle East and North Africa can contribute to fragility. In recent decades, states in the Middle East and North Africa have faced great challenges managing their water resources and providing adequate water services for irrigation and municipal and industrial users (see chapter 2). Even before the recent political turmoil, several countries in

Figure 1.3 **Main Global Risks for which the Middle East and North Africa Region Is Least Prepared**



Note: Based on survey asking, "For which global risks is your region least prepared?"

Source: WEF 2015.

[3] See for instance the discussion in Rother *et al.* (2016)

the Middle East and North Africa were struggling to manage their water resources sustainably and efficiently and to expand coverage of water supply and sanitation services. Now conflict has combined with weak institutional performance and contributed to a deterioration of water services. For instance, access to safe drinking water and sanitation has dropped markedly in some countries because of armed conflict (WHO, 2016). Effects of armed conflict include damaged water infrastructure, underfunded water utilities, and increased vulnerability of agricultural systems to climatic variability and shocks.

Fragility and political transitions have had significant impact on the region's progress toward sustainable development. In some countries, MDG gains have been reversed or halted because of conflict and political instability (UNDP, 2015). In Syria, which had been one of the top MDG performers in the region, recent conflict has pushed more than 3 million people into poverty (UNDP, 2015). Deteriorating access to water and sanitation services has led to increased incidence of waterborne diseases. In Syria, the mortality rate of children under five due to diarrhoea has increased threefold since the start of the conflict (WHO, 2015). In the Republic of Yemen, over 10 million people, about 46 percent of the total population, are considered to be food insecure, and about 12 million people lack access to safe water or sanitation, undercutting development opportunities in the country.

As conflicts die down, restoration of basic water and sanitation services should be a priority, within a longer-term strategy for recovery and development. In conflict-affected countries, moving toward the SDGs means starting recovery as early as possible by restoring basic services. In the recovery phase, water for agriculture is important as it provides for people's livelihoods. It also means that all interventions should be consistent with longer-term strategies of sustainable, equitable, and efficient development and should contribute to building back citizens' trust in state institutions (see Box 1.1).

BOX 1.1 The World Bank Group Strategy for the Middle East and North Africa

The World Bank Group's strategy - "Economic and Social Inclusion for Peace and Stability in the Middle East and North Africa"- puts the goal of promoting peace and social stability in the Middle East and North Africa region at its centre. The strategy has four pillars ("the 4 R's") that respond to both the underlying causes of conflict and violence as well as the urgent consequences through development interventions that foster inclusion and shared prosperity. The four pillars of the strategy are as follows:

1. Renewing the social contract – to generate a new development model built on greater citizen trust; more effective protection of the poor and vulnerable; inclusive and accountable service delivery; and a stronger private sector that can create jobs and opportunities for Middle East and North Africa's youth;
2. Regional cooperation – particularly around regional public goods and sectors such as education, water, and energy to foster greater trust and collaboration across Middle East and North Africa countries;
3. Resilience – to refugee and migration shocks by promoting the welfare of refugees, internally displaced persons (IDPs), and host communities by focusing on building trust and building their assets; and
4. Reconstruction and recovery – utilising a dynamic approach that brings in external partners, leverages large-scale financing and moves beyond humanitarian responses to longer-term development wherever and whenever conflict subsides.

1.3 AIMS AND SCOPE OF THE PAPER

Given the scale of the fragility and water challenges in the Middle East and North Africa, the World Bank and the Food and Agricultural Organization of the United Nations (FAO) are undertaking joint efforts to raise awareness about these issues in the region and beyond and to propose strategic responses.

This discussion paper is one outcome of this ongoing collaboration. It reflects the goal of both organisations to promote sustainable and equitable development which can contribute to peace and stability in the region. Both organisations recognise that the promotion of responsible and sustainable approaches to water management can contribute to this goal.

The aims of this paper are threefold:

- Describe how water-related challenges can act as **risk multipliers**, compounding existing situations of fragility to keep the Middle East and North Africa region in a protracted long-term crisis with dramatic consequences for the region and the world.
- Outline how improving water management and addressing water-related challenges in a comprehensive and integrated manner can **contribute to building resilience** beyond the water and agricultural sectors in the region.
- Emphasize the importance of addressing the water and fragility crises with a **long-term view and in the context of the SDGs**. Bring attention to the need to bridge humanitarian and development efforts to build resilience against a range of future threats.

The **expected outcome** is that this paper and the World Bank and FAO collaboration will raise awareness about how countries in the Middle East and North Africa and international partners can frame and address water challenges in the context of regional fragility. Increased awareness will set the stage for country-by-country and regional engagement and collaboration on specific issues.

1.4 DEFINITIONS OF KEY TERMS

Fragility, characterised by an accumulation of risk factors, includes high risk of conflict and violence, protracted political crises, and unsustainable and inequitable development paths often accompanied by natural resource mining and degradation, combined with insufficient institutional capacity by the state, system, and communities to manage, absorb, and mitigate these risks. Fragility has multiple dimensions, and it is not only limited to state institutions. The spillover effects of fragility can spread beyond national borders. This view of fragility moves away from the binary classification of states as either fragile or non-fragile towards a risk-based model that seeks to understand fragility as a combination of risk factors. A risk-based model recognises that fragility arises through multiple channels (political, environmental, social, and economic) and affects states, societies and people in different ways.

Protracted crises are here defined as "*environments in which a significant proportion of the population is acutely vulnerable to death, disease and disruption of livelihoods over a prolonged period of time. The governance of these environments is usually very weak, with*

the state having limited capacity to respond to, and mitigate, the threats to the population, or to provide adequate levels of protection" (FAO, 2010). From this definition, it follows that protracted crises are complex, prolonged emergencies which often combine natural disasters and fragility. Most protracted crises occur in fragile contexts (Maxwell *et al.*, 2011).

Resilience is here defined following FAO's definition as "*the ability to prevent disasters and crises as well as to anticipate, absorb, accommodate or recover from them in a timely, efficient and sustainable manner. This includes protecting, restoring and improving livelihood systems in the face of threats that impact agriculture, nutrition, food security and food safety*".

Risk multipliers are factors, either linked to natural or human causes, which exacerbate existing risks. Environmental and water-related risks are often cited as risk multipliers because of the effect of deterioration of natural resources and access to them, and because the uncertain occurrence of climatic and natural resource-related shocks has the potential to amplify existing tensions and instability. As will be discussed in this paper, water-related risks act as multipliers in fragile systems when policies fail to address them.

A farmer giving water to a lamb in Tarand village, 35km southeast of Teheran, where the FAO is runnning a pest management programme.
©FAO/Kai Wiedenhoefer

Women carry water home near Kairouan.
©FAO/John Isaac

Repair and provide spare parts for Al Jazeera irrigation system-suspended canals and traveling irrigation through cash-for-work.
©FAO/Cengiz Yar

CHAPTER 2

The Water Crisis in the Middle East and North Africa

Water scarcity is increasing in the region, creating risks to human development and sustainable growth. This chapter sets the stage, describing the main drivers and consequences of the water crisis in the Middle East and North Africa. This chapter identifies two fundamental causes of the region's chronic and worsening water crisis: physical water scarcity, and institutional and governance issues. Climate change is exacerbating physical water scarcity. Rising demand, intersectoral competition, and poorly adapted water governance are increasing vulnerability and having a negative impact on agriculture, cities, and businesses, affecting economic growth and increasing poverty, and contributing to unrest and conflict in the region. The long-term challenges include intersectoral allocation and allocative efficiency, sourcing water for municipal and industrial (M&I) needs, groundwater depletion, water productivity, and the sustainability of rainfed agriculture and pastoral systems.

2.1 DRIVERS OF WATER SCARCITY

Water scarcity is pervasive throughout the region and is getting worse. Water is scarce in the Middle East and North Africa, with water resources per capita just one-sixth of the world average (FAO, 2015). Countries in the region have developed a higher proportion of their available water resources and have constructed more water storage per capita than any other region in the world. Nonetheless, several countries, namely Egypt, Iraq, and Syria, have access to very significant surface water resources that flow largely from outside their boundaries. Furthermore, all countries in the region share at least one aquifer with a neighbouring country. Agriculture is the biggest user of water in the region, but now demand from other sectors is rising fast. The climate, which is largely arid to hyper-arid and highly variable, is changing, bringing new risks to the water resource and increasing the vulnerability of those dependent on it (FAO, 2015; World Bank, 2011).

The agriculture sector utilises most of the available water. Agriculture is an important sector in almost all countries of the region. Rainfed farming, largely growing cereals, is relatively low-yielding and provides livelihoods for nearly two-thirds of the rural population regionwide. Because of the mostly arid climate, there is a high level of development of water resources for irrigation, with nine-tenths of the region's water use taking place in agriculture. Water scarcity and aridity have driven relatively high levels of performance in agricultural water management. Irrigated agriculture is market-oriented and commercialised, responding to fast-growing demand from urban and export markets for higher value products. However, shortfalls persist in irrigation efficiency and crop water productivity (ESCWA, 2017).

Groundwater resources are being depleted, and competition for water is increasing. Groundwater has become a significant source of agricultural water across the region, and it has been the basis for the rapid growth of new agricultural economies in the Arabian Peninsula. However, every country in the region is now experiencing the challenge of groundwater depletion, and the overall very high rates of withdrawal of both surface and groundwater make agriculture vulnerable to claims from other sectors and the risks of climate change (GEF, 2015; FAO, 2015).

Supply constraints and rising demand are driving scarcity. Overall, water scarcity – a structural imbalance between supply and demand for water – is growing and this presents a significant threat to the region. On the **supply side**, the low water resource endowment and high climatic variability is increasing water scarcity. The already very high level of development of water resources further exacerbates this scarcity, which makes the mobilisation of new supplies difficult and costly. On the **demand side**, ever-growing demand is driving scarcity, particularly from the manufacturing and industrial sectors. In recent years, the little-voiced but pressing need for water to meet environmental and ecological requirements has also been recognised. Finally, in many countries of the region demand is inflated by an enabling environment and incentive framework that encourages overuse of water, essentially by making it too cheap. The result is a pair of challenges. First, a challenge for agriculture in the region for the coming years – how to get more production and more income with less water. Second, a challenge for resource managers and urban planners – how to meet the growing needs of the domestic, industrial and commercial water consumers (EBRD/FAO, 2017).

2.2 EXPECTED IMPACTS OF CLIMATE CHANGE ON WATER AND PEOPLE

Although changes and impacts will vary, all countries in the region are likely to be highly vulnerable to climate change. The main expected changes are higher temperatures and more heat waves, lower and less reliable precipitation, and more extreme rainfall events (Verner, 2012). Second-round effects are likely to include increased frequency and intensity of droughts and floods and seawater intrusion into coastal aquifers as sea levels rise. These expected changes will accentuate the already severe water scarcity, increase existing high levels of aridity, and intensify unpredictability and the risks of extreme weather events.

Climate change will create major risks for agriculture. Water availability is the key determinant of agricultural potential throughout the region, and climate change will affect this availability, largely negatively. Soil moisture is likely to decrease, and rivers arising within the region are likely to experience decreased flows. All water storage is likely to suffer increased evaporation due to higher temperatures. Higher temperatures will also increase crop water requirements, leading to increased agricultural water demands (McDonnell & Ismail, 2012).

These changes in agro-climatic conditions will certainly have their impact on production. Improved water use efficiency and water productivity could offset some negative impacts. Output is still likely to increase, but below trend. However, there is an element of uncertainty, introduced by the expected increased variability and increased frequency of extreme

events, especially of drought but also of destructive storms, floods and heat waves. All farming systems across the region will be exposed to increased aridity and declines in water availability, with rainfed systems most at risk, not least as increasing variations regarding water from rainfall makes agricultural planning increasingly challenging. The most marginal and affected systems – dryland and pastoral systems – are those for which fewest solutions are available, and some areas may go out of production altogether (Ward and Ruckstuhl, 2017).

Many countries in the region have prepared climate risk management plans. Countries throughout the region have developed plans anticipating climate change and preparing to handle impacts on agriculture (Verner, 2013) for Tunisia and (Verner & Breisinger, 2013) for Syria, Tunisia, and Yemen; and (Verner *et al.*, 2013) for Jordan and Lebanon. Intensive research is needed to increase the availability of technology and institutional options.

2.3 IMPACTS OF THE TRENDS IN GROWING WATER SCARCITY

Growing scarcity of water and risks of climate change set a tough challenge for agriculture in the region for the coming years: more production and more income with less water. This picture of diminishing and vulnerable supply and increasing competition from other sectors drives the challenge of scarcity for agriculture in the Middle East and North Africa. Inevitably in the coming years, agriculture will have less, not more, water. In such a dry region, water is essential to the agricultural growth needed for the rural economy to prosper and contribute more to GDP, for rural incomes to be maintained or increased, and for more food to be produced. Agriculture must become ever more water-efficient, offsetting scarcity by improved water use efficiency and water productivity (FAO, 2015). Also, climate change and the likelihood of more extreme events increases the need for a more resilient agriculture in which risk management strategies will be vital, particularly in the highly vulnerable dryland and pastoral systems (Verner, 2012).

Water scarcity will challenge urban settlements too, which is already having a negative impact on urban water provision. Already many towns and cities throughout the region are experiencing challenges in sourcing water and rising costs. Service delivery is frequently poor, as lack of bulk water leads to increasing intervals between supply periods. Some urban households in towns in the West Bank and Gaza and the Republic of Yemen receive network water less than once a month (World Bank, 2017b; Rammal, 2016; World Bank, 2017b). The population of rapidly expanding cities in many locations are not all covered by network water supply. The use of expensive tanker water, often with questionable quality, is prevalent in many of the region's towns and cities.

Despite investment in infrastructure and institutions, these problems are likely to deteriorate as water scarcity grows. Fast-growing populations, rising incomes, and expanding cities will drive continued increases in demand for water, while supply becomes more erratic and uncertain. If nothing changes, reduced freshwater availability under climate change and competition from its various users will reduce water availability in cities.

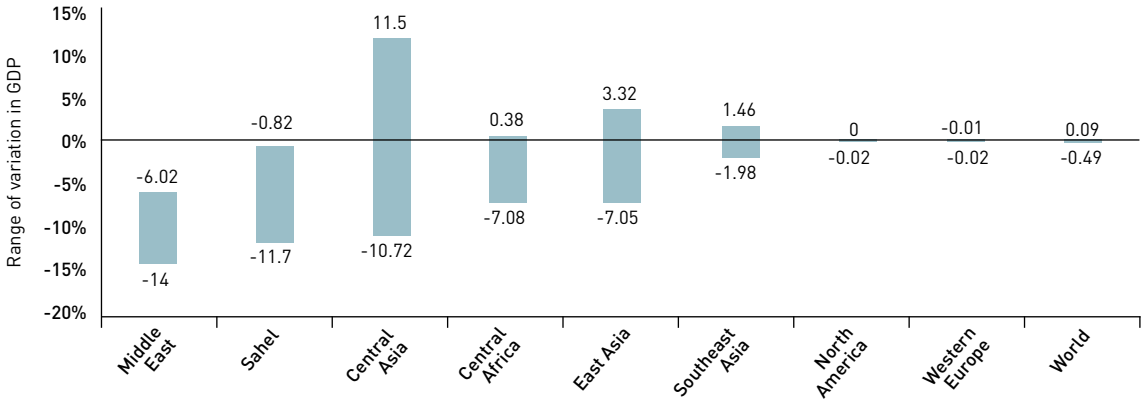
Water is a vital factor of production, and diminishing water supplies could translate into slower economic growth across the Middle East and North Africa unless policies change. The World Bank (2016) found that the impacts of climate and water scarcity on the economies

of the Middle East and North Africa will be by far the most severe of any of the world's regions (figure 2.1). Forecasts predict that under a business-as-usual scenario climate-change induced water scarcity could lead to a decline in regional GDP of between 6 and 14 percent by 2050. This alarming scenario would result from water-related losses in agriculture, health, income and property, and could send countries in the Middle East and North Africa into sustained negative growth. The World Bank (2016) also suggests that a lack of water management policies could result in these adverse growth impacts, whereas introduction of improved policies could go a long way toward neutralising them and could even stimulate growth.

Water scarcity and inadequate water services have a disproportionately negative impact on the poor (World Bank, 2016). In the Middle East and North Africa, the predominance of farm families who are dependent on rainfed and marginal pastoral systems puts many poor households at risk. In urban areas, poor households congregate on marginal lands that are more prone to floods and are most at risk from contaminated water and inadequate sanitation.

Policy failures to address competition over scarce water resources can act as a risk multiplier in already fragile contexts. When institutional responses to water issues are poor, social disorder, civil unrest, and protests often ensue, as has been observed over the years in Iran, Yemen, Iraq and Algeria (Ward & Ruckstuhl, 2017). Institutional failures to address decadal long water scarcity issues have contributed to the Syrian crisis (de Châtel, 2014; Swain & Jägerskog, 2016). Although water issues were not a direct cause of the crisis, the Syrian government's policies and practices to develop the resource in an inequitable and unsustainable way are among the indirect causes of fragility. The government's general indifference to the social, economic, and humanitarian consequences of its policies on water and its failure to protect vulnerable populations against the effects of climatic disaster through adequate social safety nets have contributed to the loss of confidence and widespread disaffection which have fuelled the Syrian uprising.

Figure 2.1 **The Economic Impacts of Climate Change-Induced Water Scarcity by World Region, 2050**



Note: The range of impacts as determined by the type of policies implemented to cope with water scarcity, from a business as usual policy (-14%) to a policy seeking to reallocate water to the most productive uses (-6%).

Source: World Bank 2016.

2.4 WATER GOVERNANCE ISSUE: WHAT MAKES CHANGE SO HARD?

Institutional and governance factors have contributed to water scarcity and exacerbated environmental, political, and socio-economic fragility in the region. These institutional and governance factors include distortions in policies and institutions which do not limit overexploitation of freshwater resources and lack of incentives to promote efficient and high-value use of water.

2.4.1 Distortions in Policies and Institutions

Past policies focused on developing supply rather than on integrated management of the resource. For years, governments across the region focused incentives and investments on increasing supply and use, so that today there is virtually no more water to be harnessed. Past incentives and lack of regulation contributed to inefficient use and depletion of the resource. Governments passed water laws to allocate water rights and regulate them but often failed to develop the institutions to implement the laws. Little was done to provide against the rising incidence of extreme climatic events (FAO, 2015; World Bank, 2007).

Investment and the policy environment have favoured agriculture in recent years, but at the expense of trade-offs with growth, social equity, and environmental sustainability. Many countries across the region have made considerable investment in irrigation, rural infrastructure, and farmer services such as research and extension. Agriculture has responded with rapid growth rates. However, some components of past public policy introduced structural distortions, notably:

- Allocations to agriculture now have the status of acquired rights, and there is no real mechanism for reallocating water to growing urban and industrial centres.
- Lack of demand management incentives has led to reduced water use efficiency in some water uses, most notably agriculture.
- Lack of regulation of groundwater extraction has led to depletion of the resource.
- Food self-sufficiency policies promoted food production with negative impacts on land and water resources and with an opportunity cost to both households and the national economy, as they undermined diversification and production of high-value crops.
- Incentive structures favouring commercial and irrigated production disfavoured research and investment in rainfed farming, preventing innovation and research on green water[4] from taking place (FAO, 2015; World Bank, 2007).
- **Countries in the Middle East and North Africa have been progressively reversing these policies, but their effect persists.** Recent years have witnessed a move away from these policies. Most countries in the region have adopted all or parts of the practice of integrated water resource management. In agriculture, the role of the private sector and commercial agriculture is better recognised and has greatly contributed to exports and farm incomes.

[4] Green water is the water stored in soils. More precisely, it is the soil moisture available for evapotranspiration from cropland and permanent pasture.

Additionally, countries in the region have come to a more integrated appreciation of agriculture's role in the economy, ecology and society. This appreciation includes recognition of the value of conserving ecosystems and of the environmental services provided by rural areas, such as water infiltration and soil conservation (Ward and Ruckstuhl, 2017).

However, the legacy of past policies persists. Agriculture still commands the lion's share of water in the Middle East and North Africa and transferring water from agricultural use to higher value areas is proving very hard. The explosion of groundwater use in a largely unregulated environment is proving incredibly hard to rein in (GEF, 2015). Rainfed farming is still the poor relation despite the large number of poor households involved, the poverty and marginality of their farming systems, and the growing water-related threats.

2.4.2 Incentive Framework for Use of Water in Agriculture

Policy analysis in recent years has pointed to the role of the incentive structure in promoting overuse and inefficient use of water. Perverse incentives for excess irrigation persist in almost all countries of the region. Governments have nonetheless been working to correct these distortions. There are three components of the incentive structure where there has been progress in the Middle East and North Africa, but there is scope for further steps in (1) irrigation water service fees, (2) protection of domestic production and (3) energy subsidies.

Countries in the region are moving slowly toward increased cost recovery for irrigation water supply. In public irrigation, governments in the Middle East and North Africa have sought to recover management, operation and maintenance costs (MOM) and sometimes a share of the capital costs. There has been considerable progress, but there remains a shortfall on many schemes, which limit autonomy and may impair services. Not recovering costs also limits the scope for private sector participation (EBRD/FAO, 2017).

Although there has been progress, protection keeps farm gate prices high in many countries, distorting incentives. Protection of domestic cereals production or direct price support to local cereals production encourages the use of water for lower value cereals cultivation. Several countries have reduced or eliminated barriers to cereals imports or phased out price support because they recognised the economic cost of this policy (ESCWA, 2017).

The most pervasive subsidies are in pumping water, where cheap energy prices have driven groundwater depletion. In many countries in the Middle East and North Africa, energy subsidies have made it cheaper to pump water, and this has improved the financial profitability of both surface water lift pumping for irrigation and of groundwater abstraction (Commander *et al.*, 2015). These increases have contributed to the decline of renewable and non-renewable groundwater reserves in some locations (Closas & Molle, 2016). For part of the regional agricultural production, the reduction of energy subsidies for groundwater pumping would reveal the true costs of production, making agriculture uneconomical especially in areas relying on deep fossil aquifers.

Adjustments to the incentive structure continue, but they often require careful balancing of trade-offs. The incentive structure is often highly complex and comprises not only elements from the agricultural sector and water sector policies but also elements of broader macro policies.

A simple measure, such as increasing the price of energy, will have repercussions throughout the economy and may have a pronounced negative impact on the poor. The Republic of Yemen is an example of the difficult choices that governments need to address concerning water use in agriculture. In Yemen, pumping for irrigation and drainage accounts for 28 percent of the total electricity and diesel consumption (Commander *et al.*, 2015). Irrigation supports Yemen's agricultural sector, which remains a key component of the Yemeni economy and a major source of direct and indirect income. However, unsustainable groundwater withdrawals driven by fuel subsidies can severely harm agriculture in the long run by depleting the groundwater resources on which it depends. It is very challenging yet essential to identify and implement measures to strike a balance in this context (Ward, 2015).

Changing the incentive structure for water use in agriculture also requires careful consideration of the repercussions on food security and distributional effects. The extent to which poor and vulnerable households would benefit from changes in the incentive framework, reductions in agricultural water use or reallocation needs to be quantified to inform policies. Similarly, the unintended consequences on food security and loss of livelihoods need to be accounted for when developing incentives to reduce water use in agriculture (ESCWA, 2017; Ward, 2015). It is important to recognise that water for agriculture plays a very important role in the post-conflict recovery phase as countries attempt to normalise again.

2.4.3 Trade-Offs between Food Security and Self-Sufficiency

Food security is a perennial preoccupation throughout the countries of the region. The region is dependent on food imports (ESCWA, 2017; Allan, 2001). No country in the region approaches self-sufficiency in cereals, and most countries import a large share of their food needs. The lack of self-sufficiency is one reason food security concerns have been a constant preoccupation in the region, and this preoccupation has intensified in recent years which have seen higher prices and price volatility, particularly the shock of 2008. However, this concern is somewhat alleviated for the longer-term by forecasts that food prices will stabilise at lower than current levels. Nonetheless, concern remains at national level about the impact of any global food price rises or volatility, particularly in those countries most dependent on imported food (FAO, 2015).

Attempts to boost production of food in the Middle East and North Africa where a country lacks comparative advantage may result in reduction of food security by reducing household incomes. At the consumer level, most households in the region enjoy adequate nutritional status, although the picture is not uniform across the region, particularly in rural areas, in the poorest countries, and in countries affected by conflict and violence. On the production side, several countries promote domestic food production. However, studies have found scant relation in the countries of the region between national food security and the level of self-sufficiency in food production – and some studies have found that attempts to promote self-sufficiency have reduced food security by reducing household incomes (Lampietti, 2011).

Coping with food security crises during conflict versus early recovery presents quite different challenges. Where conflict has ravaged a land, production and markets are disrupted. When households are able, they will inevitably retreat to self-sufficient production. Interventions will need to provide both for equipping farmers with basic means of production (seeds, fertilisers and

tools) and for large-scale humanitarian feeding programs. In the recovery period, the challenge will be to rebuild value chains and rehabilitate infrastructure and productive capacity. As value chains stabilise, restructuring can intervene. The progression will thus be from self-sufficiency to meet basic needs toward commercial agriculture where food crops are just that – crops like any other, grown where they are the most profitable, within a given risk environment.

2.5 CRITICAL CHALLENGES FOR LONG-TERM SUSTAINABLE DEVELOPMENT

The previous sections described the status and trends in water availability and water governance. This section discusses how these trends generate challenges, and in particular how physical water scarcity and growing risks have combined with short-sighted policies to generate a water crisis in the Middle East and North Africa. This crisis has led to a failure to act on current and anticipated trends.

2.5.1 Groundwater Depletion

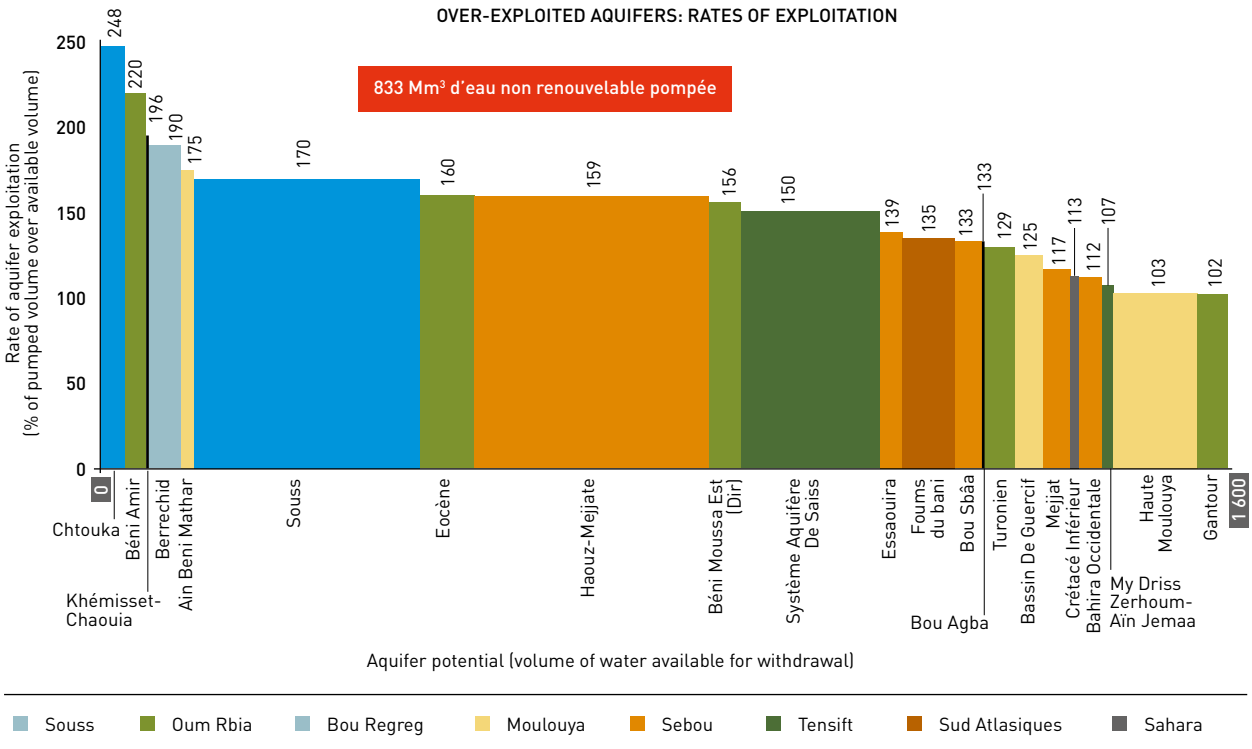
The groundwater boom has revolutionised agriculture in many countries. From the 1970s, all countries of the region experienced the arrival of the tube well and motorised pump technology at the same time as internal and export markets for higher value agricultural produce were growing. Groundwater proved a bountiful resource which has revolutionised agriculture and the lives of farmers in many locations in the region; 8 of the world's top 20 groundwater irrigating countries are in the Middle East and North Africa (GEF, 2015; IWMI, 2007). Groundwater has proved very popular as an easily developed, flexible source of just-in-time water under the farmer's direct control.

Groundwater plays a key role in buffering hydrological variability and in maintaining water supplies during dry spells or when surface water sources are contaminated. This happy combination revolutionised the economics of agriculture based on groundwater use and led to rapid growth of private irrigated agriculture and farm incomes. The rate of adoption was accelerated by favourable government programs, including tax-free imports, cheap credit, and low-cost energy, and by the absence of any regulation of groundwater development. The use of groundwater for supplementary irrigation also boosted rainfed agriculture in many locations.

However, unregulated development has led to inequitable access and now to rapid depletion in many locations. Alongside these benefits, two negative results emerged. First, the open access nature of the resource and the absence of institutions to regulate development and abstraction led to a free-for-all situation. The nimbler or more powerful have appropriated water rights, and other related rights have been attenuated: for example, where groundwater abstraction has led to the drying up of springs (Ward 2015). Second, the common pool nature of the resource has led to a "race to the bottom," as no individual has any incentive to conserve the resource, but rather to pump it out before his or her neighbour does. In this situation, poor and marginalised households are the most exposed to groundwater depletion. These two results have contributed to conflict and have driven rapid depletion of the resource in many locations (see figures 2.2 to 2.4). Deterioration of water quality and saline intrusion is another result of depletion (GEF, 2015).

Several cities are particularly exposed to groundwater depletion. Cities such as Amman and Sana'a rely heavily on over-abstracted groundwater. As supply sources are depleted, these cities are increasingly turning to expensive solutions to transfer water either via infrastructure or more commonly via tankers from rural areas (World Bank, 2017c; Ward, 2015; GEF, 2015). This often results in much lower levels of service for urban users, who spend large portions of their incomes to purchase low quality water from private vendors.

Figure 2.2 **Morocco - Annual renewable groundwater potential and current withdrawal rates**



Source: SNE – Monitor from Regional Initiative on Water Scarcity – Morocco Country Paper

Figure 2.3 **Drop in the water table at Souss**

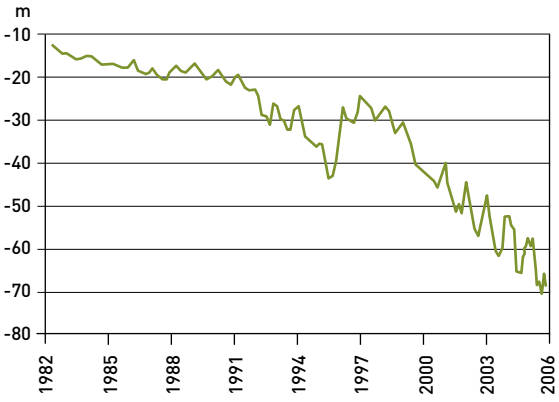
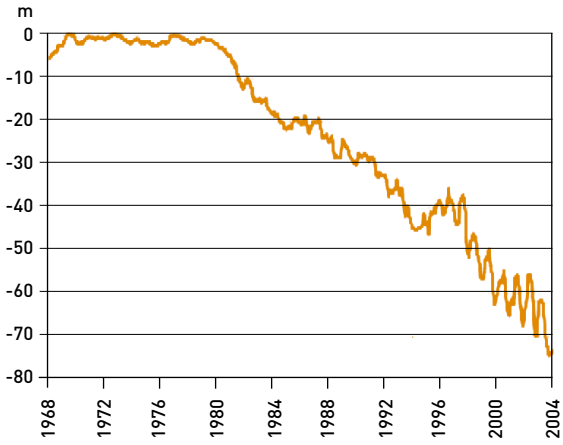


Figure 2.4 **Drop in the water table at Saiss**



Source: DRPE from Regional Initiative on Water Scarcity – Morocco Country Paper

Establishing a governance framework for groundwater management is exceptionally hard. The countries in the Middle East and North Africa have tried to recover state control over groundwater through licensing and regulation systems, but these – as everywhere in the world – have proved extraordinarily difficult to impose. The case of Jordan is among the more successful: this combined a military-style licensing and regulation operation with incentives to compliance in the form of permits to sell groundwater to the profitable potable water market (FAO, 2015). As mentioned above, working only through the incentive structure has sometimes had negative side effects. Attempts in the Republic of Yemen to reduce over abstraction simply by raising the price of diesel were not successful, as this led to price rises throughout the economy which provoked considerable civil turmoil (El-Katiri & Fattouh, 2017).

Decentralising responsibility to the local level can be a successful approach, especially if combined with other measures. Several countries have registered success with approaches that decentralise water resources management to local areas and communities and give incentives to greater water use efficiency through subsidies to water-conserving infrastructure (in-field pipe distribution, hydrants and pressurised irrigation) and which advise on water management and irrigated cropping (Ward, 2015). Supply-side measures such as aquifer recharge enhancement, rainwater harvesting, and urban wastewater reuse increase incentives. A similar approach has been successful in Egypt, for example at Salheia in the East Delta where a local groundwater association established a common management system and invested in a piped network, and now manages the aquifer sustainably (van Steenbergen, 2002). Essentially, technical and economic measures can help manage demand, but institutional measures are needed to develop groundwater governance for sustainability (FAO, 2016).

2.5.2 Efficiency in Agricultural Water Use

Performance in irrigation in the Middle East and North Africa is at the higher end of the global range. The Middle East and North Africa has practised irrigation for more than five millennia, and constant improvements have made irrigated agriculture highly productive. Farmers in the region pioneered irrigation even before history began, and the earliest civilisations in the Middle East and North Africa were founded on the people's skill in harnessing water for productive agriculture. Improvements in technology and management have been continuous since then, and today irrigated production in the Middle East and North Africa can boost yields per hectare by up to four times compared with rainfed production. In one study on a 100 000 hectare scheme in Morocco, irrigated yields for wheat, fava beans, and sugar beet were more than twice as high as rainfed yields – and four times as high in the case of maize (WaterWatch, 2011). The case for irrigated cultivation is technically very strong. The main constraints are water availability and economic viability.

Overall, water use efficiency and crop water productivity are relatively high in the Middle East and North Africa. There is, nonetheless, considerable scope – and an imperative – for further increases. Thus, in general, as would be expected in a water scarce region such as the Middle East and North Africa, crop water productivity is already quite high but with scope for improvement, particularly in progressive conversion to pressurised irrigation and protected agriculture, and in switching to higher value crops. With rising scarcity and intersectoral competition, exploiting this potential is now an imperative.

Irrigation schemes in the Middle East and North Africa are relatively efficient overall at delivering a timely and good quality water service, but there is both scope and imperative for improvement. In a series of recent studies, FAO worked with country teams to measure performance of seven irrigation schemes in the Middle East and North Africa and to compare that performance with a sample of 50 schemes in other regions of the world. Water delivery service was rated higher in the Middle East and North Africa than elsewhere at all levels of the system (CIHEAM/FAO, 2013). The largest surface irrigation schemes in the Middle East and North Africa – 80 percent of the irrigated area – are thus relatively efficient but again there is both scope and an imperative for improvement.

Although water service delivery and productivity are good by world standards, there is no more water available, so the path to growth must be to get "more $ for less drop." Typically, good water service translates into yields per hectare and yields per cubic meter which are well above global averages. Physical crop water productivity is at the high end of the global range for some countries in the region. Economic crop water productivity in some parts of the Middle East and North Africa is almost five times that of schemes in other regions (CIHEAM/FAO, 2013). There is nonetheless a wide variation in performance among schemes and among farmers on the same scheme and a considerable yield gap, which improved agricultural water management could help to close (WaterWatch, 2011). There is thus scope to improve crop water productivity (more $ for less drop), and this will be essential as water scarcity continues to increase.

2.5.3 Vulnerability of Rainfed Agriculture

Rainfed agriculture is the predominant farming system in the Middle East and North Africa but is relatively low yielding and vulnerable to shocks, so that raising productivity and strengthening resilience are priorities. Across the Middle East and North Africa, the three farming systems that are wholly or predominantly rainfed – highland mixed, rainfed mixed and dryland mixed – cover barely 13 percent of the total land area but support almost two-thirds of farming households (62 percent). Incomes are typically low, and poverty is prevalent in many communities (FAO, 2011; FAO, 2015). These systems are relatively marginal and vulnerable to shocks such as climate change. Events in northern Syria over the last decade are good illustrations of the vulnerability of these systems (see Box 3.3), and they demonstrate the clear links between government mismanagement of water issues and loss of trust in the state.

Raising productivity and strengthening the resilience of these systems, including through improved management of green water, would have a significant impact on reducing poverty and risk. Although varying greatly by locations, the main natural resource constraints faced in the rainfed systems of the Middle East and North Africa are low and variable green water availability, environmental and soil problems of salinity, temperature and lack of nutrients. Although technological change has occurred, there has never been a Green Revolution for rainfed agriculture, and the availability of technical solutions to farmers in the Middle East and North Africa is limited. Risks are prevalent: climatic and hydrological risk, including drought and floods, and intensified by climate change risks, market risk, and land and water tenure risk. Farming strategies are naturally characterised by risk aversion and low levels of investment. New technology, investment, and institutional adaptation are needed to raise productivity and to help farmers adapt to climate change (FAO, 2011; FAO, 2001).

2.5.4 Challenge of Urban and Rural Water Supply

Access, efficiency, and viability of urban water supply is generally adequate in the region, although large disparities exist. In urban areas of the Middle East and North Africa, most water and sanitation services are decentralised, semiautonomous utilities. Access to water piped through the network is high in most towns, although in poorer areas standpipes or tankers may be the primary source. Although access statistics for the region are quite high, they hide the reality on the ground. Service standards, including continuity and quality of supply, vary greatly from country to country and within countries. These important aspects of water supply and sanitation provision were not included in the Millennium Development Goals, reducing incentives to provide countrywide estimates. Efficiency is generally moderate, although often with high nonrevenue water. Financial viability is marginal almost everywhere across the region, with tariffs set too low and poor collection rates (World Bank, 2007).

It is important to recognise that there are very wide variations in local conditions when considering country-level averages. Many urban settlements suffer from less than acceptable services. Some towns lack adequate bulk water sources. Connection rates to the network can be as low as 50 percent even in capital cities, and supply intervals may stretch into weeks or even months. Water quality may be very low. Physical losses and other nonrevenue water can reach 40 percent, and coverage of operation and maintenance through adequate tariffs and collection rates may be very low (World Bank, 2017a; Ward, 2015).

The region still faces challenges regarding sanitation and wastewater treatment. In many cities cesspits and septic tanks predominate. Where flush toilets are connected to the sewer network, rates of treatment can be low, and much of the raw sewage is discharged into the environment (World Bank, 2017a). Recycling of treated wastewater is limited, despite the supply augmentation needs in most locations in the region (Bazza, 2003).

The Middle East and North Africa has a good track record in ensuring access to safe water in rural areas, less so in rural sanitation. The challenge is to expand access, to ensure that water sources are adequate and sustainably managed, and to support the local management and full cost recovery vital to the operating sustainability of water services. Expanding access to safe sanitation in rural areas is also a priority. As with supply, access to sanitation has significant implications for health outcomes and women's and girls' development (World Bank, 2017c; World Bank, 2005).

Sustainable Development Goal 6 provides an opportunity to move beyond access metrics to provide more nuanced measures of water services. For instance, SDG 6.2 places great emphasis on ensuring quality of access to sanitation and hygiene for vulnerable groups, especially women and girls (and additionally SDG 5 and SDG 10 target gender and other social equity issues as a component of development outcomes). SDG 6 also promotes improved principles of water management, encouraging integrated water resources management.

CHAPTER 3

Compounding Risks: Water Crises as Potential Risk Factors in Fragile Systems

3.1 OVERVIEW

Water crises strain the ability of individuals and societies to maintain livelihood security and political stability. Water-related issues severely challenge ecosystems, sometimes leading to irreversible damage if left unaddressed. Fragile systems characterised by social, economic and environmental challenges are particularly exposed to water's destabilising potential. Water crises can aggravate existing fragilities, compounding socio-economic risks related to poor governance and marginalisation, and triggering social friction, unrest, migration, and violent conflict.

This paper calls for policy-makers, practitioners, and researcher to focus attention on water's role as a risk factor in fragile systems. Fragile systems are characterised by existing social tensions, weak political accountability, lack of institutional capacity, and often less will and ability to address water-related challenges. Recognising that fragility results from an accumulation of risk factors, this section seeks to identify how factors related to water can aggravate social, political, or economic risks and, consequently, escalate latent and active conflicts.

Institutions and policy choices mediate water-related impacts on people and economies. Water-related challenges can amplify fragility risks when policy design and implementation do not adequately promote sustainability, inclusion, and resilience. In fact, governance systems have the capacity both to respond proactively and reactively to knock-on effects of water insecurity and crises.

For millennia, countries in the Middle East and North Africa have been at the forefront in developing institutions to manage and access scarce water resources and to prevent conflict in the context of a highly variable climate. Many of these institutions emerged at the local level to address local issues and mitigate social conflict. However, the scale of the current water crisis is unprecedented and requires coordinated responses across state institutions in an unprecedented way in some locations. Pressure on water resources due to population growth and rapid technological and economic change means that state institutions have a fundamental role to play in addressing water-related challenges. If these entities and their policies fail, then this could contribute to instability in the region.

This paper does not claim that there are direct causal linkages between water crises, social tensions and unrest, migration, or other manifestations of fragility. Drivers of fragility involve a range of factors that interact in complex and often unpredictable ways. The water crisis in the Middle East and North Africa can be one factor that risks increasing fragility, but it is certainly not the only one.

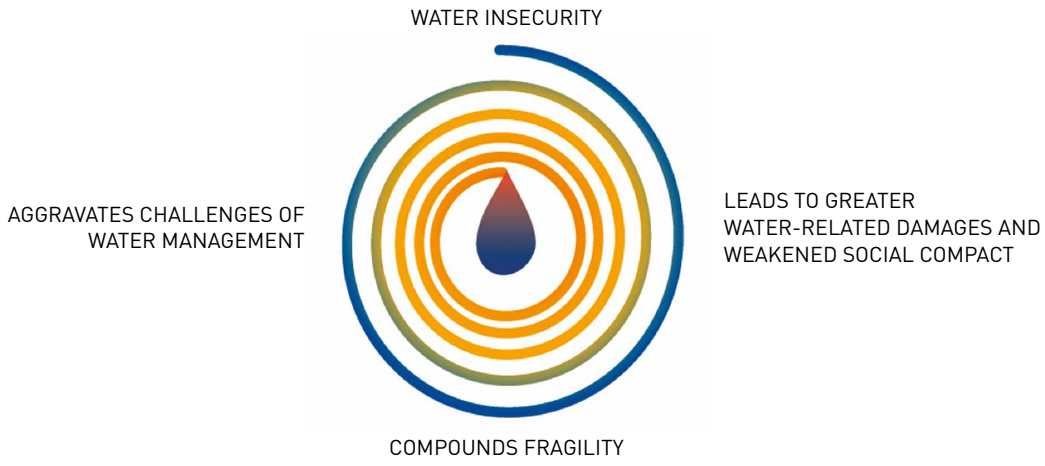
3.2 THE VICIOUS CYCLE OF WATER CRISES AND FRAGILITY

Achieving water security in fragile systems is difficult. Addressing water-related challenges may mean providing reliable and affordable water supply, as well as responding to droughts or ensuring protection of water rights. Furthermore, the impacts of these challenges on populations, economies, and the environment can worsen as fragile institutions appear unable to address them adequately.

Weak and ineffective institutions, histories of conflict, unsustainable livelihood systems, and decaying or damaged infrastructure characterise fragile systems. These and other factors related to fragility compound challenges to sustainable water management, making it more difficult, for example, to provide water services for household and productive uses successfully and equitably.

This compounding nature of water and fragility gives rise to a "vicious cycle." In this vicious cycle, fragility makes it more difficult for water management to be effective, in turn amplifying the negative political, social, and environmental consequences of water-related challenges (figure 3.1). Chronic water scarcity and governance issues as discussed in Chapter 2 could give rise to this vicious cycle in the Middle East and North Africa. Situations of prolonged armed conflict leave water infrastructure damaged, cause a loss of institutional capacity, and prevent

Figure 3.1 **The vicious cycle of Water Insecurity and Fragility**



Source: Sadoff, Borgomeo and de Waal, 2017

necessary investments in maintenance and operation of water systems from taking place. In these fragile systems, prolonged conflict compounds re-existing water-related challenges, effectively *breaking* water systems (ICRC, 2015). Fragility often implies a perpetual weakening of institutional capacity and scarcity of financial resources needed to respond to water crisis.

Water acts as a risk multiplier in multiple ways, reflecting water's critical roles in shaping livelihoods, influencing societal well-being, and supporting economic production. Different levels of analysis will expose different water and fragility interactions. At the household level, for example, water crises can contribute to fragility by compromising coping capacities and forcing migration. At the national level, water crises can act as risk multipliers in fragile contexts compounding household level hardships, and the failure of political and economic systems to respond adequately. Under these circumstances, governments can be perceived as ineffective and illegitimate, challenging the civil-government social contract, and leading to unrest and conflict.

3.3 CONSTRUCTING EVIDENCE ON THE VICIOUS CYCLE OF WATER CRISES AND FRAGILITY

Constructing evidence on the vicious cycle of water crises and fragility requires careful analysis and multi-disciplinary expertise. Although there is a long history of tensions and conflict over water resources, broader interactions between water and fragility are not well-document and researched in practice. This paper presents preliminary evidence on the multiple linkages between institutional failures to address water-related challenges and fragility in the Middle East and North Africa with the aim of shedding some light on these important, yet not very well-documented, interactions.

The vicious cycle of water and fragility materialises under multiple circumstances. These circumstances include: (1) forced displacement, (2) damage to water infrastructure, (3) weaponisation of water, (4) loss of human capital, (5) institutional issues, (6) transboundary waters and (7) water-related disasters.

3.3.1 Water management and service delivery against a backdrop of historic levels of displacement

Displacement can increase demands on water resources and services in host communities. When large-scale population movements take place, host communities struggle with sudden increases in need for water supply and wastewater treatment. Where systems are unable, or host communities struggle to find agreeable solutions to meet these demands, uncontrolled exploitation might take place, or resource conservation efforts may be side-lined to meet humanitarian needs. Similarly, under these conditions, human fragility greatly increases as the most vulnerable members of the displaced and host communities face significant challenges in accessing affordable water.

Population displacement places additional demands on strained systems, making it more difficult to provide water services. The presence of large numbers of refugees in the Middle East and North Africa is straining infrastructure and institutional systems which were not

designed to experience such a sudden increase in population. Furthermore, those increased demands are for an unknown period, making service solutions extremely complicated to plan. Water supply and wastewater management can design temporary gap solutions (for example, using tanker truck services), or they can be more permanent (for example, wells and pipelines), both ushering in a myriad of long-term sustainability questions for host communities. In any case, when water and sanitation service quality decreases or becomes inequitable, dynamics among migrant, displaced and host communities can perpetuate the water-fragility cycle.

In Jordan Azraq's oasis, the challenges of sustainable water management at times of historic levels of displacement are particularly stark. Over many years, heavy abstraction of groundwater for irrigation and drinking water for Amman and Zarqa significantly damaged the fragile ecosystem of Jordan's Azraq Oasis and the surrounding wetlands, which are a haven for migratory birds, and plant and animal biodiversity. Jordan's government reduced abstractions and undertook a project to restore the wetlands partially. However, the nearby Azraq Refugee Camp, run by the UN High Commission for Refugees, has accommodated 50 000 Syrian refugees since 2014. These tragically dispossessed people are naturally a priority, so the human need for water has supplanted conservation efforts to protect the environment.

Displacement can also alter a basin's water balance. Satellite imagery of Syria shows how conflict and migration caused reductions in agricultural land and water use (Müller *et al.*, 2016). The reduced use of water increased surface water flows to neighbouring Jordan. It is important to note that this effect does not offset the water needs of the refugees in Jordan nor their impact on water and wastewater distribution systems, rather it highlights the significant interactions between water resources availability and migration at the basin scale.

Displacement places unplanned burden on water service providers and infrastructure in host communities. In Lebanon, where no formal camps are maintained, and most Syrian refugees reside in existing communities, the Ministry of Environment estimates that domestic water demands increased by 43-70 million cubic metres per year (MOE/EU/UNDP, 2014). This increase corresponds to an increase in national water demand of 8-12 percent (MOE/EU/UNDP, 2014). The increase in water demand is exacerbating current stresses on water resources, especially groundwater. On a similar scale, the influx of refugees has contributed to an estimated 8-14 percent increase in wastewater volumes generated in Lebanon (MOE/EU/UNDP, 2014).

3.3.2 Damage to water infrastructure

Armed conflict can compromise infrastructure, challenging water resources management. Armed conflict can cut off water sources from distribution systems, severing the links between reservoirs or rivers and irrigation schemes or water supply networks. Damage to wastewater treatment infrastructure can degrade the quality of surface and groundwater supplies. Damage to water pumping stations or treatment plants can cut off potable supplies, also contributing to increased leakage from water distribution systems. In the short term, this forces communities to either resort to alternative expensive private vendors or consume contaminated water, impairing human health and security. In the long term, contamination of water resources during or following armed conflict can irreversibly compromise those resources.

Targeting water infrastructure has emerged as a central aim of parties in conflicts in the Middle East and North Africa. Parties in conflict target infrastructure to gain access to urban areas, displace urban populations or punish civilians perceived as supporting opposing parties (Sowers *et al.*, 2017). In Libya, the Human Rights Council reports that major water networks have been disrupted, alongside water wells (Human Rights Council, 2016). Similar episodes were observed in Syria and made international headlines (Oliphant, 2016). In 2016 government forces targeted water pumping stations in militant-controlled eastern Aleppo, leaving some 250 000 people without access to water. In retaliation, militants switched-off a pumping station that supplied water to western Aleppo leaving about 1.5 million people in the western part of the city without water (UNICEF, 2016). Table 3.1 presents results from a World Bank assessment of the physical damage to 457 water supply and sanitation assets in eight Syrian governorates. Overall, two-thirds of the water treatment plants and half of the pumping stations were destroyed.

Table 3.1 **Damage to water and sanitation infrastructure in Syria.**

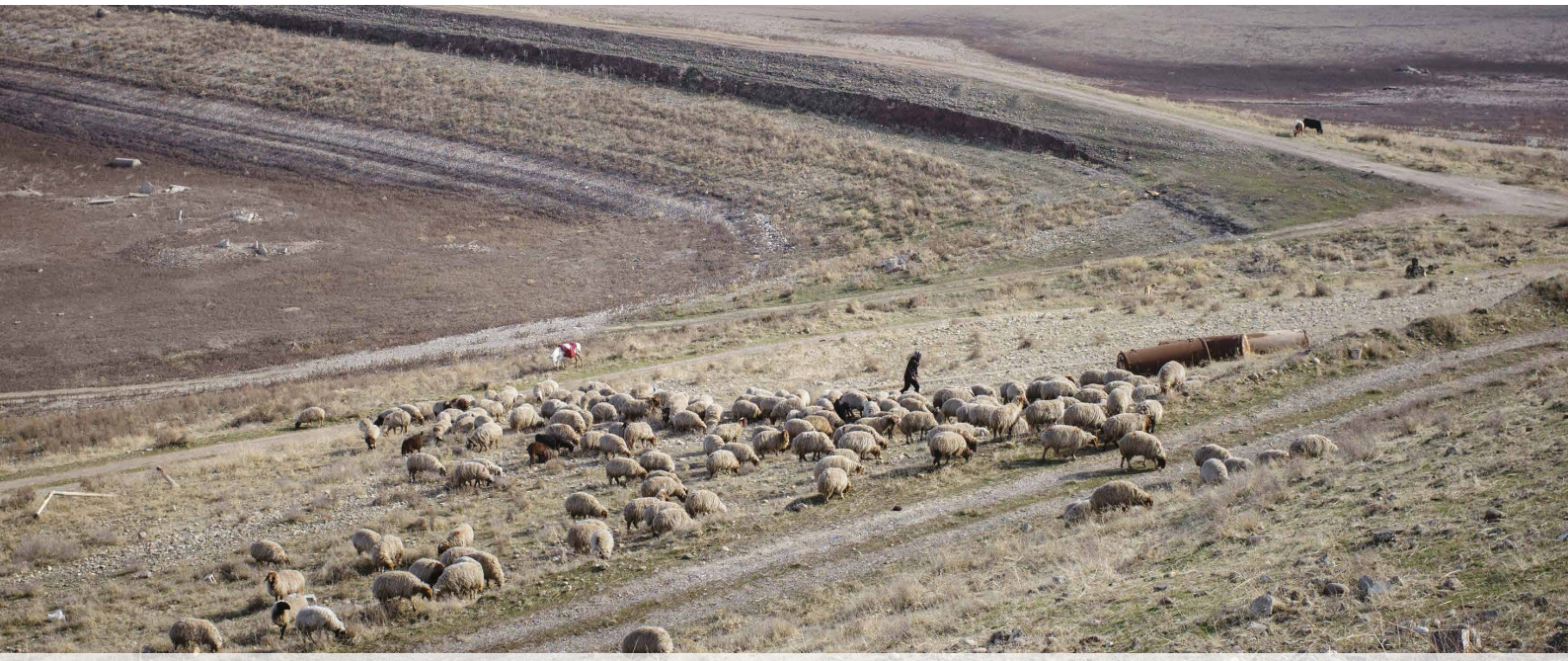
Asset type	Baseline coverage	Destroyed	Partially damaged	Total damaged	Percentage of assets with damage
Well	234	3	29	32	14%
Water Tower/Tank	176	18	34	52	30%
Water Treatment Plant	8	0	5	5	63%
Sewage Treatment Plant	4	0	1	1	25%
Dam	6	0	0	0	0%
Other Drainage Str.	3	1	1	2	67%
Pumping Station	21	0	12	12	57%
Storage Reservoir	2	0	0	0	0%
Water/Sanitation Office	3	2	1	3	100%

Source: World Bank, 2017.

Destruction of water and sanitation systems facilitates the spread of water-borne diseases, hitting children the hardest. In Yemen, the destruction of water and sanitation systems has left 14.5 million people without access to safe water, which makes it challenging to contain the spread of water-borne diseases (UNICEF, 2017). A cholera outbreak initially declared in October 2016 has spread to 19 governorates with 53 000 suspected cases, with children under five accounting for 32 percent of the suspected cases (UNICEF, 2017).

Physical damage to water infrastructure does not fully reflect the challenge of service delivery in fragile contexts. Water service delivery depends on using electricity, which is also often targeted during armed conflict. Targeting of electrical systems, as observed for instance in Gaza (Sherwood, 2014), reduces the functionality of many water systems and was, in fact, the main reason for interruptions in water supply in Syria, followed by direct damage to pumping stations and distribution networks (World Bank, 2017).

Conflict-driven disruptions of water infrastructure affect food security, incomes and opportunity. At the individual and household level, failure to provide domestic water services impairs livelihoods and well-being. Water consumption may drop below levels needed to



A man walks sheep through the Mosul Lake basin near the Mosul Dam Pumping Station.
©FAO/Cengiz Yar

maintain health status, and recourse to alternative providers can impinge upon household budgets. Within households, failure of network supply might increase the burden on the most vulnerable, especially women who remain largely responsible for domestic water supplies and family health issues. At a community and societal level, failure in irrigation water services will affect agricultural production and incomes. In Syria, the FAO reports that due to damage to pumping stations for surface and groundwater irrigation, farmers have abandoned their fields and turned to less nutritious and remunerative crops (FAO & WFP, 2016).

3.3.3 Weaponization of water

In situations affected by conflict and violence, water can be used deliberately to foster instability and bring harm to communities. These situations might happen when adversaries or political opponents impose reductions in water availability or when large-scale deliberate contamination of water supplies is used to destabilise and impair livelihoods (Swain & Jägerskog, 2016).

In Syria and Iraq, water resources and water infrastructure were used as bargaining chips in negotiations and to intentionally inflict damage and suffering on civilians. In 2013 and 2014, Daesh seized control of key infrastructure on the section of the Euphrates that passes through Syria and northern Iraq, including many of the water-storing, flow controlling, and regulating structures. In early 2013, Daesh captured the Tabqah Dam in Syria, the largest dam and the main water storage and flow-regulating structure on the Syrian section of the Euphrates. Control of the dam gave Daesh control over the water supply for the Aleppo governorate and parts of the Raqqa governorate and cut off access to bulk water supplies for over 5 million Syrians (Sowers *et al.*, 2017). Daesh took control of the Fallujah regulator in Iraq and used this control to halt the flow of the Euphrates, with serious consequences: water was cut off to the downstream governorates, and upstream towns, including Abu Ghraib, were flooded. In both cases, Daesh effectively "weaponised" water to weaken opponents by directly targeting civilian infrastructure.

3.3.4 Loss of human capital and information: impact on water service delivery

Disruptions in human capital compromise governments' abilities to address water-related challenges, perpetuating the vicious cycle. Beyond damaging or destroying physical infrastructure capital, fragility also takes an enormous toll on countries' human and institutional capital. Skilled workers may flee conflict-affected areas, leaving a knowledge vacuum on the operating characteristics of water supply distribution systems or on norms used to allocate water.

Many skilled workers leave conflict and fragility-affected areas. This loss of human capital increases the challenges of operating and rebuilding water distribution systems and makes it virtually impossible to promote sustainable water management and protection of the resource. The International Committee of the Red Cross notes how water authorities in Iraq experienced a 'brain drain' of skilled staff following the 2003 invasion (ICRC, 2015). Given the lack of written records on the operation of water systems, the knowledge lost with these skilled workers is not easily replaceable and makes it more difficult to break the water-fragility cycle.

The effects of losses of human capital challenge the prospects for restoring services. In Syria, the conflict is estimated to have led to a 30 percent permanent loss in the country's human capital stock compared to 2010 levels (Hamilton & Nguyen, 2017). This loss significantly compromises the ability of institutions to deliver public services, including water. Given the length of time it takes to rebuild and recover human capital, these effects will persist and perpetuate the water-fragility cycle.

Alongside losses in human capital, lack of information compounds the challenges of water management in fragile systems. Information essential to the management of water resources is hard to gather at the best of times – particularly for groundwater – and is virtually impossible to collect in fragile contexts. This lack of information is due to non-existent or low-quality data on the situation and status of water resources, poor information sharing between parties where social tensions exist, and an overall lack of institutional capacity that may be exacerbated by competing budget priorities. The absence of information means that public sector institutions cannot develop management plans or systematically monitor water use. Consequently, this can contribute to and perpetuate the water-fragility cycle.

3.3.5 Institutional issues

Failure to address complex water challenges also results from overlapping and poorly coordinated institutions (Ruckstuhl, 2014). Institutions play a key role in water resources management, ranging from water ministries and laws down to local user associations or sets of traditional collaborative management rules. Many states in the Middle East and North Africa have managed to upgrade and modernise these institutions and to adapt them to the realities water scarcity in the twenty-first century. However, in many contexts weak and non-inclusive governance gives rise to inequitable and poor water outcomes.

Poor relationships between service providers, public sector institutions and water users are another driver of the failure to provide water services in fragile contexts. Often, in fragile

contexts, where insecurity can be high, and customer engagement can be difficult or dangerous, service providers take a top-down approach, making them less accountable to the people they serve. These poor relationships make it more difficult for service providers to collect revenues, which reduces financial viability and leads to a deterioration of service delivery levels.

Lack of accountability of service providers contributes to disaffection among the population. Global experience shows that when service providers are accountable and when their business processes are consultative this strengthens the relationship between them and their customers, as the population can better understand operating systems and user responsibilities (de Waal & Hirn, 2015). By contrast, when service providers are unaccountable, and customer-provider relationships are weak, this can be indicative of both a fragile context and perpetual factors of resentment and disaffection.

Poor accountability, customer orientation and transparency in service delivery can exacerbate feelings of marginalisation and exclusion. Often water infrastructure and service provision are more accessible to affluent and influential citizens, contributing to perceptions of marginalisation and exclusion which fuel fragility. In fragile contexts, often there are marked biases in investment in water infrastructure toward better-off areas. These investments can be due to a range of interconnected factors in these locations, such as households' abilities to pay higher prices, elite influence and the heightened security necessary to maintain services. The perception can become one of inequity and unfairness regardless of the existence (or not) of corrupt intentions to benefit affluent neighbourhoods. In Sana'a, for example, more affluent areas receive higher quality and more continuous supplies than marginal areas, and many of the marginal areas are not connected to the network at all. The most vulnerable and the displaced often need to purchase water from expensive private vendors to meet their basic water requirements. This expense, in turn, exacerbates feelings of marginalisation and exclusion, weakening the social compact and increasing risks of fragility.

In fragile contexts, institutional issues are exacerbated by challenges in revenue collection. During periods of armed conflict, it is practically impossible for service providers to collect revenues as economic conditions worsen and service areas become dangerous to access physically. In some municipalities of Gaza, for example, collection efficiency dropped to as little as 5 percent following 2014 hostilities. On the ground, shortfalls in cost recovery compromise the operating performance of water systems, preventing essential maintenance from taking place and causing loss of skilled personnel in institutions charged with water service provision. Furthermore, poorly maintained irrigation and water supply systems and poorly staffed agencies lead to declines in service levels and lower cost recovery. This decline fuels perceptions of exclusion and social grievances and undermines the legitimacy of public institutions, perpetuating the water-fragility cycle.

3.3.6 Transboundary waters

A large portion of water resources in the Middle East and North Africa is transboundary. About 60 percent of surface water flows across boundaries, and all countries share at least one aquifer with a neighbouring nation (World Bank, 2017a). All major surface water bodies are shared: eleven riparian countries share the Nile, Tigris-Euphrates between Turkey, Syria and

Iraq, the Yarmouk river amongst Syria, Jordan and Israel, the Jordan amongst Lebanon, Syria, Jordan, Palestine and Israel. Large aquifers are also transboundary, including the Western Mountain Aquifer (between the West Bank and Israel) and the Disi Aquifer between Jordan and Saudi Arabia.

Despite a long history of shared water management in the region, there has been little attention paid to cooperative management of transboundary water. Absence of cooperative agreements on transboundary water resources has had severe consequences on livelihoods and ecosystems, for instance by contributing to the desiccation of the Mesopotamian marshes (Fawzi *et al.*, 2016). It has also brought several tensions between countries in the region, for instance when Israel threatened armed intervention if Jordan and Syria went ahead with the al Wehda Dam on the Yarmouk river or when filling of the Tabqah Dam in 1973-1975 escalated tensions between Iraq and Syria (Ward and Ruckstuhl, 2017).

Cooperation over transboundary waters is especially complex when conflict and fragility affect riparian countries. Countries affected by fragility, conflict and violence are poorly placed to defend their interests or to enter into cooperative arrangements, as such they bring additional complexity to transboundary water management.

3.3.7 Water, disasters, and fragility dynamics

The impact of water-related disasters differs depending on the nature of the event and the human ability to respond. The impact of water-related disasters on individuals and communities depends on the magnitude and the nature (slow or rapid onset) of the event, but it is also a function of the vulnerability of systems and their ability to manage adverse conditions. Slow onset disasters, such as drought, typically have impacts over large areas and heighten resource scarcity across entire regions or countries. Small-scale and rapid onset events like flash floods or landslides tend to have more localised impacts. Both slow and rapid onset disasters can act as tipping points in already fragile contexts, triggering rapid changes in social and political dynamics.

How political and governance choices mediate water-related disasters impacts society. Public sector institutions have significant influence in reducing vulnerability to water-related disasters at multiple levels and in assisting once disasters materialise. Water-related disasters on their own are not responsible for fragility or conflict. However, where responses are inadequate, the legitimacy of local authorities can be challenged, the marginalized and discontented can mobilize, the government-civilian social compact can be jeopardised, and these disasters can consequently expose the fragility of the state in its unpreparedness and incapacity to manage risks and mitigate their impacts (Harris *et al.*, 2013).

Social cohesion is reduced when disaster response favours particular groups or is perceived to promote inequity. Disaster is, above all, a time for social solidarity. Disasters provide an opportunity for institutions and the state to build trust. Conversely, if interventions are seen as unfair – intentionally or unintentionally favouring certain groups – social tensions can result, and the social compact can be damaged. Response to water-related disasters might neglect vulnerable or less influential members of society, generating inequality and

fuelling grievance toward dominant elites or certain members of a community. Lack of gender-sensitive approaches to respond to disasters can also increase ill-feeling and social tensions. Evidence from multiple countries shows that when gender issues are ignored (for instance in resettling migrants in camps), disaster response might create harm, inducing gender-based violence and weakening social cohesion.

Slow onset water-related disasters, such as droughts, are often cited as risk multipliers in fragile systems. Droughts compound vulnerability in contexts where agricultural and water policies favour unsustainable water abstraction and where access to land and water is unequal or not controlled clearly, increasing vulnerability to climatic variability. When droughts strike such systems, and when government response is inadequate or sluggish, rural households and even whole communities can fall into poverty. Livelihood systems may be harmed beyond repair, and rural to urban migration may follow (see Box 3.1). If governments do not prepare adequately for these movements, then tensions can increase among migrants and within host communities. Tensions could rise as competition for scarce water and land resources become more severe, and as knock-on effects, such as price inflation, job shortages and inadequate affordable housing, take hold. Consequently, local authorities could pay the price, as the civilian-government social contract is challenged.

Failure to protect from water-related disasters erodes citizens' trust in state institutions. Most citizens view disaster preparedness and response as primary responsibilities of the state. Typically, on these initiatives central and local government institutions work in collaboration with the private voluntary sector (for example the Red Crescent) and international aid agencies. However, in fragile contexts, state institutions – though they may have the best intentions – can be poorly positioned and resourced to plan, mobilise, and coordinate prevention and response strategies. And the perceived failure to respond adequately to a disaster erodes the social compact and may provide opportunities for government opposition groups to fill that void and gain influence in affected communities.

In fragile contexts, capacity to build resilience and to prepare for and respond to disasters is limited. Water-related extreme events are inevitable — but disasters are not. The frequency and severity of water-related extreme events are set to increase in the coming decades because of climate change (Verner, 2012). However, good natural resource management policies which conserve water, protect watersheds and set-up early warning systems can go a long way toward reducing vulnerability to these events and toward increasing resilience. Additionally, if disasters emerge, preparedness and response can significantly reduce the potential for negative impacts on people and their economic systems. In sum, protection from water-related disasters helps to break the water-fragility cycle.

Active conflict elevates the severity of risks and complicates recovery efforts during water-related disasters. Amid fragility and violence, and following conflict, people can be forced to migrate from their homes, often settling in areas with higher exposure to water-related disasters, such as steep slopes, wadis, or riverbanks with a high risk of flooding (Harris *et al.*, 2013). Similarly, armed conflict can reduce access to affected areas, making it difficult for relief efforts to reach affected populations.

The relationship between the Syrian crisis and water issues has sparked the interest of politicians, commentators, and scholarly research. Scholars and commentators alike have focused attention on exploring the linkages between water issues, conflict and migration. They have suggested that climate change was a factor in the Syrian unrest (Gleick, 2014; Kelley *et al.*, 2015), but emphasise that these findings are preliminary and not based on extensive social science research. More research is essential to substantiate factors driving unrest (Selby *et al.,* 2017). Based on existing evidence it cannot be said that water issues or climate change are factors in the crisis given that scholarly research on these important linkages is still in its infancy (Ward & Ruckstuhl, 2017).

Rather than 'blaming the drought', emphasis and research should be directed towards understanding the legacy of institutional policies and practices that developed and allocated water resources in inequitable and unsustainable ways, increasing vulnerability to drought shocks. As argued in this paper, the institutional failure to address water-related challenges compounds fragility, not the water-related challenge itself. In the case of Syria, the role that institutional indifference to the social and economic consequences of water policies and inefficiency in addressing water-related disasters played in fuelling grievance and loss of confidence in the government should be explored more (Box 3.1).

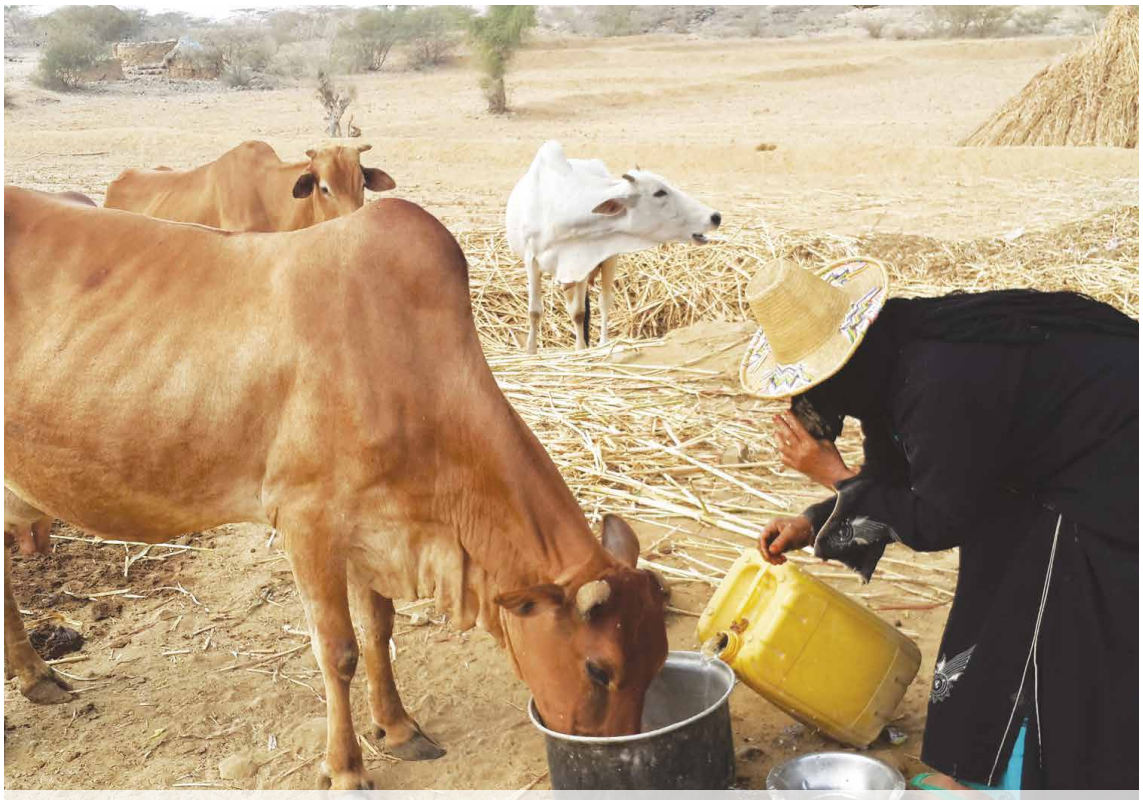
BOX 3.1 Humanitarian Disaster Due to Unmanaged Consequences of Drought in Syria

A series of droughts that struck Syria from 2006 onwards accelerated the rise in poverty and plunged portions of the population into deep food insecurity. The United Nations (UN) estimated that between 2008 and 2011, the drought affected 1.3 million people, with 800 000 people "severely affected." As the drought extended into a second and third year, the population was less and less able to cope. With no crops for two consecutive years, farmers no longer had seeds, while herders were forced to sell or slaughter their flocks because of a lack of pasture and fodder.

Statistics on resulting food insecurity in Syria are stark. Malnutrition, which was already widespread in the northeast, rapidly increased, with "up to 80 percent of those severely affected surviving on a diet of bread and sugared tea." The incidence of nutrition-related diseases soared. By 2010, 42 percent of infants in Raqqa governorate were suffering from anaemia, and the UN estimated that 3.7 million people, or 17 percent of the Syrian population, were food insecure and that 300 000 people had migrated because of the drought, leaving more than two-thirds of villages in two governorates (Hassakeh and Deir ez-Zor) deserted. Some 65 000 families migrated from the northeast to the tent camps that lie around Damascus and Aleppo. Families that settled in a tent camp in Mzeirieb, near Dara'a, from 2008 onwards found their relatives and friends who had fled previous disasters and had been subsisting in these conditions for a decade or more.

Source: de Châtel, 2014

Displaced civilians flee fighting between Iraqi forces and ISIS with their livestock.
©FAO/Cengiz Yar



A female dairy farmer provides her cow with water.
©FAO/Chedly Kayouli

CHAPTER 4

Building Resilience: Water Management to Respond to Protracted Crises and Promote Peace

This chapter presents a roadmap for building more resilient water resources management and water service provision in the Middle East and North Africa. The main message is that countries in the region need to move from a focus primarily on immediate, reactive responses to a balanced, long-term approach. This approach would build growth-oriented resilience to shocks and protracted crises focused on sustainable, efficient, and equitable water resources management and service delivery.

The chapter first looks at the prime importance of water in achieving the SDGs. The rest of the chapter looks at ways in which water management can reduce fragility and contribute to sustainable, equitable and resilient development in the region through improved governance and institutions, incentive systems that accurately reflect the value of water and investment.

4.1 WATER AND THE SUSTAINABLE DEVELOPMENT GOALS IN THE MIDDLE EAST AND NORTH AFRICA

The Sustainable Development Goals provide a framework to guide and monitor responses targeted at promoting long-lasting solutions to the complex water and fragility challenges in the region. Water management will be crucial in determining whether the world achieves the SDGs and their objectives to eliminate poverty and foster shared prosperity (World Bank, 2016). Given the extreme and growing challenges of water scarcity, this is perhaps more relevant to the Middle East and North Africa than to any other region in the world. Water is the common currency that links nearly every SDG, and it will be a critical determinant of the ability of countries in the Middle East and North Africa to achieve the targets beneath the 17 goals. For example, water supplies are vital to produce food and will be essential to attaining SDG 2 on food security. Clean and safe drinking water and sanitation systems are necessary for health as called for in SDGs 3 and 6, and water is necessary for powering industries and creating the new jobs identified in SDGs 7 and 8. None of this is achievable without adequate and safe water to nourish the planet's life-sustaining ecosystem services identified in SDGs 13, 14 and 15. And to mitigate risks of social division and fragility, these targets must be achieved in tandem with the goals of gender equity (SDG 5), social equity (SDG 10), and just, peaceful and inclusive societies (SDG 16).

Box 4.1 SDGs targets and water

Water is critical to many of the 17 SDGs, but the following are either water-centric (SDG 6 targets) or includes important references or clear connections to aspects of water management:

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.A By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling, and reuse technologies

6.B Support and strengthen the participation of local communities in improving water and sanitation management

Zero hunger:

2.3 By 2030, double the **agricultural productivity** and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that **increase productivity and production**, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, **drought, flooding** and other disasters and that progressively improve land and soil quality.

Good health and well-being:

3.3 By 2030 end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, **water-borne diseases**, and other communicable diseases.

3.9 By 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, **water, and soil pollution and contamination**.

Affordable and clean energy:

7.2 By 2030, increase substantially the share of **renewable energy** in the global energy mix.

Sustainable cities and communities:

11.5 By 2030 significantly reduce the number of deaths and the number of affected people and decrease by percentage the economic losses relative to GDP caused by disasters, including **water-related disasters**, with the focus on protecting the poor and people in vulnerable situations.

Responsible consumption and production:

12.2 By 2030, achieve the **sustainable management and efficient use of natural resources.**

12.4 By 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, **water** and soil to minimise their adverse impacts on human health and the environment.

Climate action:

13.1 Strengthen resilience and adaptive capacity to **climate-related hazards and natural disasters** in all countries.

Life on land:

15.1 By 2020 ensure conservation, restoration and sustainable use of terrestrial and **inland freshwater ecosystems and their services**, in particular forests, **wetlands**, mountains, and drylands, in line with obligations under international agreements.

15.8 By 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and **water ecosystems**, and control or eradicate the priority species.

Source: World Bank using UN, 2015. Sustainable Development Knowledge Platform.

4.2 BUILDING WATER GOVERNANCE AND INSTITUTIONS FOR RESILIENCE

4.2.1 Tackling Water Scarcity by Improving Management of the Region's Water Resources

Reform of governance and institutions is a priority in fragile contexts which are often characterised by glaring institutional weaknesses and social inequities. The priorities for governance and institutions are to improve efficiency and accountability, strengthen capacity for regulation, reinforce participatory approaches, and improve the investment planning process. Regarding governance and institutions, countries in the region have had considerable experience in setting up institutions and adopting policies to implement best practices in water sector governance and institutional development. There is nonetheless scope in many countries to further improve accountability, strengthen capacity for regulation, improve the investment planning process, reinforce participatory approaches, and further reduce the fiscal burden (FAO, 2015). Furthermore, these reforms need to address inequities that perpetuate perceptions of exclusion and marginalisation more effectively, and intentionally strengthen the social compact between these institutions and the communities they are expected to serve.

In fragile contexts, a basin approach offers the chance to adopt inclusive, participatory approaches which will improve equity and build ownership and will begin to knit webs of trust in institutions from the bottom up. Integrated Water Resources Management (IWRM), including the basin approach, has been adopted to varying extents and with varying effectiveness in the countries of the region. A key challenge is to develop institutional mechanisms for equitable and efficient intersectoral water reallocation that, transparently, account for the distributional impacts those allocations have on different socio-economic groups (Ward & Ruckstuhl, 2017).

The agenda for subsidiarity, decentralisation, and participation is essential to include water users as responsible partners in managing scarcity. For agriculture, this requires empowerment of water user associations and, more broadly, development of inclusive institutions for responsible local water management. On the options of subsidiarity, decentralisation, and participation, water user associations (WUAs) and community-led natural resource management have been adopted across the region, largely successfully, as a mechanism for engaging local stakeholders in responsible management of water and land resources. Second generation issues include how to empower local stakeholders genuinely and how to organise relations among stakeholders to meet economic and environmental requirements and to address social risks and prevent competition and conflict. Next steps could explore ways to further empower water user associations and other institutions for local-level natural resource management and to strengthen their capacity. All these approaches are highly appropriate to fragile contexts and recovery in post-conflict situations (FAO, 2015).

Water management offers the opportunity to renew the social contract and strengthen government and citizen relationships. The long history of shared water management in the region demonstrates how water offers an opportunity to bring people together to solve complex challenges related to the allocation and delivery of water. It is through partnerships around water management of local communities and their institutions with public agencies that the warp and weft of a new social compact may be woven (Ward, 2015; Ward & Ruckstuhl, 2017).

For municipal and industrial water use, the twin priorities are efficient service delivery for all in adequate quantity and quality at an affordable price, and to provide the service through financially viable and accountable service providers. The twin objectives for municipal and industrial uses are linked, as consumers throughout the region have shown that they are prepared to pay high prices for good services. But poor performance by unaccountable service providers leads to a downward spiral of low-cost recovery, nonviable utilities, low investment and further deterioration of performance (World Bank, 2007).

In fragile contexts, the priorities will be to establish governance conditions that make utilities locally accountable and to ensure availability of water resources, investment, and incentivised and competent management that promotes inclusion. These conditions will require: accountable and transparent governance; regulations and incentives for both service providers and consumers to perform well; adequate levels of investment; and a relationship between service providers and consumers that meets both efficiency and social equity criteria. Although scant resources constrain many service providers, experience throughout the region

shows that utilities can develop these characteristics. Those utilities that do acquire these characteristics perform far better, provide better services and achieve much higher levels of customer satisfaction (World Bank, 2007; World Bank, 2017a; World Bank, 2017b).

Measures to act on the supply-side to mitigate drivers of scarcity can include the economic reuse of wastewater and drainage water, and desalination for high-value uses such as cities and industry. Although the region has developed a higher share of its water resources than any other part of the world, supply-side management could nonetheless bring some additional water from unconventional sources like wastewater reuse. However, this requires scrupulous planning and management. Drainage has been the "poor cousin" of irrigation, yet Egypt and other countries in the region have demonstrated that both drainage management and drain water reuse can provide low-cost ways to increase water efficiency and water resource supplies, and boost productivity. In Egypt, 10 percent of agricultural water is recycled drainage water, and that success could be matched in other countries where there is large-scale surface irrigation (FAO, 2015). For high-value uses, particularly municipal and industrial, desalination will be a viable option in many locations, particularly in coastal areas, but the environmental implications of energy use and brine disposal require careful attention.

In fragile contexts, the priority is more likely to be protecting existing sources and improving allocative efficiency and management rather than developing new water resources. Where there has been conflict or mismanagement, first-order priorities will include rehabilitation of infrastructure and institutional reforms to improve supplies equitably and inclusively.

On the demand side and over the long term, incentive frameworks need to be adjusted to promote water use efficiency, water productivity and sustainability. Over recent decades, all the countries in the region have actively implemented demand management measures for agricultural water. However, almost everywhere, there is scope for adjustment of the overall incentive framework that farmers face in agricultural water management. Further adjustments to incentive structures and development of best practices could help improve incentive frameworks that promote water use efficiency and water productivity in agriculture.

In fragile contexts, getting incentives right will be a tough challenge and may not be a priority in the short term. Farmers or domestic consumers will only pay more for water services if they value the service and if they trust the service provider. Partnership approaches will be vital in this area. For example, including water user associations in irrigation boards and consumer representatives on the boards of utilities. In irrigation, the broader incentive framework farmers face – terms of trade – will need to prioritise both incentives to efficient water use **and** farmers' net incomes. These incentives might, for example, give priority to encouraging high-value commercial crops over cereals production. And for overall success, these systems should consider the grievances, inequities and perceptions of marginalisation that can motivate consumer behaviour (FAO, 2015).

Service provision needs to be on a business-like footing for municipal and industrial use. The key issues for municipal and industrial use are to improve utility efficiency to improve service delivery. They must also keep costs down and reduce nonrevenue water and put water

and wastewater services on a business-like footing through a combination of appropriate water service fee setting, vigorous collection management, and customer outreach (see Box 4.2). Again, in fragile contexts, this is an opportunity to effect needed reforms – but to be sustainable this needs to be done in partnership with water users.

BOX 4.2 Improving Water Service Delivery with Public-Private Partnerships

Public-private partnerships (PPPs) in utilities have been implemented in the Middle East and North Africa to tackle financial constraints in water service delivery. PPPs in utilities can be one of the tools (among others) available to governments for improving the performance and financial sustainability of the water sector.

Public-private partnerships have been very active in the Middle East and North Africa region to support improvements in efficiency and quality of service delivery. PPPs in the water utility space have mostly worked using management and performance-based contracts. The advantage of this type of partnerships is that the ownership of the assets remains in the hands of the public utility. The private operator becomes involved over short to medium time scales (5-7 years) in the operation and maintenance of municipal water and wastewater systems where the public utility seeks improvements in service delivery and quality.

Utility PPPs can also focus on reducing leakage in distribution networks and ensuring that these efficiency gains are maintained over time. In this case, the benefit of the partnership is that the public utility gains by reduced levels of non-revenue water and the contractor by performance-based fees linked to volume of water saved.

4.2.2 Tackling Groundwater Depletion

Future development pathways need to promote more robust groundwater governance that enhances productivity, equitable access, and sustainable quantity and quality of groundwater resources. Due to the invisibility of the resource, groundwater governance is exceptionally difficult to reform, even though the need for change can be especially acute once the resource is fully developed. These difficulties are true whether a top-down or a bottom-up approach is selected – or a blend. In practice, options for countries in the Middle East and North Africa to improve groundwater governance and manage groundwater demand are outlined below (GEF, 2015).

Decentralized, participatory approaches offer opportunities for improved management of the resource. Several countries in the Middle East and North Africa have started to decentralise groundwater resource management to the local level, for example to water user associations or community natural resource management groups. There has been some localised success in low governance environments such as the Republic of Yemen, where users have been left to manage their resources in the absence of government, and in higher governance environments such as Egypt, where modern WUAs have had success in self-regulation (World Bank, 2017c; Ward, 2015). However, at the same time, decentralisation in fragile systems can enable power dynamics that induce inequities, thus tempering the resilience of marginalised groups. Decentralisation schemes need to manage these risks.

Monitoring, information, education and communications. A key challenge in managing groundwater is that is an invisible resource. Experts have difficulty quantifying the resources

and determining sustainable yields. Experience has shown that "you cannot manage what you cannot measure," and that where users have a knowledge of the resource and the consequences of their decisions, there are stronger incentives for sustainable management. There has been some success with partnership approaches where public agencies help groundwater users assess and monitor the resource to establish the basis for community self-regulation. As groundwater users improve their understanding of the resource, they are better equipped to adjust their behaviours and build strategies for resilience (FAO, 2015). Better equipped users are especially valuable in fragile and conflict-affected contexts where perceptions of insecurity can tend to influence behaviours that perpetuate the water-fragility cycle.

Improving the efficiency and profitability of groundwater use. A common approach is to help users improve *productivity* of water use, in the hope that this will lead them to reduce consumption. Programs have thus introduced more efficient and water-saving technology, especially pressurised and localised irrigation and protected agriculture, changes to higher value or more water efficient crops, and improvements in water management, farming and postharvest. Complementary supply-side measures have been implemented such as recharge infrastructure to increase water availability. The drawback of this approach is the Jevons paradox: increased efficiency of use of a resource results in more people using it as it is more profitable to do so. In practice, there is a lot of evidence that improving productivity increases incomes but little evidence that it has contributed to water saving or any reduction in groundwater depletion (FAO, 2016a; FAO, 2016b).

A phased and participatory approach to modify the incentive structure can contribute to reducing groundwater depletion. There have been some successes in changing incentive structures to favour conservation and efficiency. This approach has the advantage that governments often control the economic levers that determine the incentive framework within which groundwater users operate. Governments can usually influence both the revenue side (for example through trade policy) and the cost side, including the cost of pumping (for example through energy policy) and the cost of technological upgrading (for example through tariffs on equipment or cost-sharing programs like those in Saudi Arabia and Morocco). One weakness is that some of these incentives may turn out to be blunt instruments that have considerable impacts outside of the groundwater sphere. For example, increasing energy prices has knock-on effects throughout the economy. Even within the groundwater economy, there may be unintended consequences such as reduction of output and employment or impoverishment of farmers (Ward, 2015). Therefore, stakeholder consultations are even more important to build confidence in these multidimensional and complex government policies and to identify and prevent these negative consequences or risks to the social contract. These approaches should also be preceded by other options to be successful such as information sharing, reduction of water dependency, safety nets to prevent negative consequence for the poorest farmers who often rely entirely on groundwater to sustain their livelihoods (FAO, 2015).

There is scope for combining several of these approaches and for region-wide sharing of information. There is no silver bullet, but in practice, a combination of approaches may be most effective. Given the extensive use of groundwater in the region and the common crisis of depletion in all countries in the Middle East and North Africa, there can be enormous benefit from regionwide data sharing. In addition to hydrologic data, information on groundwater

governance and management at local and higher levels, and policy and institution building experience all inform the common effort for sustainable resource management. Localised experiences are diverse, and the complexity of water governance in the Middle East and North Africa is compounded by the range of fragile and conflict-affected situations. A review of a range of relevant examples from across the region and the globe can help identify best practices in different types of situations. Furthermore, this can facilitate the country-to-country exchange of valuable practical knowledge and skills (FAO, 2015).

The best strategy in fragile and post-conflict contexts would likely be a partnership of decentralised participatory approaches working in combination with supportive public agencies. Again, this is consistent with inclusive, consultative, bottom-up approaches that can help to rebuild the fabric of the state (see Box 4.3) and which have worked in the region for millennia (Ward & Ruckstuhl, 2017). However, as noted above, risks of elite capture and inequitable benefit distribution exist in these approaches as well. And in fragile and

BOX 4.3 From Reconstruction to Commerce: Community Development Councils in Afghanistan

Afghanistan's National Solidarity Program (NSP) has built social capital in rural areas affected by conflict. This program, operated through community development councils, democratically elected bodies responsible for local governance of development projects. These projects create physical infrastructure, including water supply and sanitation and irrigation, and develop human capital, primarily addressing women's demands for literacy, hygiene and education. Microfinance institutions have used these councils as entry points to form credit or livelihood-based groups, as well as producer and business associations. These associations are now being linked to the private sector, to establish market linkages and introduce financial resources in rural areas affected by conflict.

NSP has worked through Community Development Council (CDCs) to identify and implement over 81 000 small-scale reconstruction and development activities, providing over 13 million Afghans with access to improved water supply and sanitation, rural roads, irrigation, power supply, health and education services. The program has generated 47.8 million days of work for skilled and unskilled workers, injecting much needed short-term wage transfers into poor rural communities throughout Afghanistan. Recent evaluation evidence suggests that CDCs are playing an active role in socio-economic development. In communities with CDCs, 70 percent of community members recognise the Councils as the main actors of local development. Furthermore, CDCs have increased the participation of people previously excluded from decision-making, most notably women.

From the perspective of the national government, while NSP has been a major success story, it also operates under some constraints. First, the NSP model was never adopted by Afghan cities. Second, despite many efforts by the Ministry of Rural Rehabilitation and Development and the World Bank, other line ministries have been reluctant to work through CDCs, viewing them as project committees, resulting in fragmentation and parallel channels of service delivery. And third, NSP block grant sizes are too large for the government to sustain over the long-term given the fiscal scenario for the country.

In response to these and other clear development challenges, in December 2014, the new Unity Government declared its commitment to reform and recovery, replacing the NSP with the Citizens' Charter Afghanistan Project (CCAP). The objective of the CCAP, in effect a social contract between the government and CDCs, is to improve the delivery of core infrastructure and social services to participating communities through strengthened development councils. These services are part of a package of minimum service standards that the government is committed to delivering to citizens.

Source: Terasawa, Karim and Takada,2013; Komorowska, 2014; and Wong, 2016

conflict-affected situations where human needs can be especially acute, and perceptions of insecurity can be especially high, advocates of decentralisation need to be aware of the dangers. When pursuing any decentralised approach, power dynamics need to be monitored to ensure that vulnerable and marginalised groups are included in the local systems in a fair and equitable that accounts for their needs (FAO, 2015).

4.2.3 Adapting to Climate Change

A key area for government action is developing climate change adaptation strategies, which provides an opportunity to promote social inclusion and build patterns of trust and collaboration with local communities. Agricultural adaptation strategies and associated public services plans should incorporate local farmers' adaptation efforts when appropriate. For the preparation of adaptation strategies, experience shows that an iterative, top-down or bottom-up approach based on evidence, research, and farmer experience yields best results. In general, outcomes are likely to improve where government, communities, and farmers work together on both technology and institutional agendas (Verner, 2012).

Likewise, public agencies need to work in support of local people to strengthen resilience through technology and institutional adaptation. The responses should target agricultural productivity and environmental protection. A wide range of both technological and institutional adaptation measures are available for most farming systems. Farmers are already applying many of these measures. The challenges will be to assure knowledge-based approaches that combine government ability to guide adaptation through the incentive structure, research, and technical and institutional support with farmer knowledge, skills and adaptive capacity (Verner 2013). Research, extension and information are critical components in adaptation strategies, as is learning from and with farmers, including traditional knowledge. For implementation, policies and programs will be needed to support farmers in adapting agricultural practices based on a practical partnership between farmers and public agencies (FAO, 2015). This entire agenda is suited to forging links between state and community in fragile and conflict-affected systems.

There will be cases where the best approach is to support a transition away from agriculture. Agricultural income is by far the largest source of overall rural household income, and adaptation in farming will be the principal concern of rural households across the region. Because aridity will increase, and water is the binding constraint to agriculture in the region, farm income needs to be supplemented by other sources of income within overall rural household-level livelihood strategies. Adaptation strategies at the household level need to develop income opportunities less dependent on natural resources, alongside programs for agricultural intensification. Diversification of livelihoods will thus be an important adaptation option. At the limit, local conditions may dictate a change in farming systems and even out-migration. As countries overcome conflict and fragility, recovery programs should be broad and promote diverse livelihoods and viable livelihoods alternatives for those who seek to make a change. These programs should strategically mitigate factors that perpetuated the fragility-water cycle. Furthermore, livelihoods programs during recovery need to consider the vulnerabilities and needs of households making livelihoods transitions (McDonnell & Ismail, 2012; Ward & Ruckstuhl, 2017).

Governments will also need to evaluate trade-offs between supporting climate change responses in agriculture and preparing parts of the rural economy for transition away from agriculture or for migration. In areas where rural livelihood options are inadequate or insecure, people are likely to migrate, particularly during periods of climate stress such as droughts and floods (Wodon *et al.*, 2014). Governments will have to help households prepare for this migration and, to maintain the social compact in mitigating the fragility-water cycle, must do so inclusively (Verner, 2012; Ward & Ruckstuhl, 2017).

Hydro-meteorological and water resource monitoring are essential to building the knowledge on which adaptation strategies are based. At the regional and country level, climate information and resource monitoring are essential to preparing responses to climate change. Technologies for this are now well developed and are freely available. The most advanced data and modelling tools incorporate social and demographic data which, when ground-truthed through research and consultations, ensure resilience and response strategies effectively tailored to community needs and vulnerabilities.

4.2.4 Building Resilient Food Systems

A major concern of many countries facing water scarcity and climate change is anticipated impacts on food security, and these concerns are far more intense in fragile and conflict-affected contexts. After active conflict and violence, once a functional level of security is achieved, establishing long-term food security is of critical importance. But as recovery progresses and as value and supply chains strengthen, there is a shift from food production to ensuring that adequate, nutritious, affordable foods are available in markets and that people have the income to buy it and the ability to travel to obtain it. At the same time, safety nets need to be strengthened, to improve supply chain efficiency and to cooperate with global efforts to stabilise food markets and prices. Poorer countries may also seek bilateral and multilateral agreements for food aid. Better off countries requiring assurance of food supplies can reduce exposure to market supply and price risks not only by improving supply chain efficiency but also by introducing cost-effective risk management instruments calibrated to the risk assessed (FAO, 2011a; ESCWA, 2017).

4.3 INVESTING IN INNOVATIVE POLICIES AND PRACTICES

There are many ways to improve water service and productivity through irrigation modernisation. Performance on surface irrigation in the region is at the higher end of the global range but can be raised further by improving the flexibility, equity and reliability of water services, by in-field intensification to raise crop water productivity, and by further modernisation of both infrastructure and institutional arrangements. Increasing water efficiency and closing the yield gap in surface irrigation requires modernisation of both irrigation infrastructure and institutions, including use of benchmarking (FAO, 2015). Countries in the region will also need to factor the implications of the rising cost of energy into planning and operations, taking account of the implications of the energy-water nexus.

In fragile and conflict-affected systems, modernisation of irrigation infrastructure and institutions can be built into the investment program during the recovery period. However, financing these improvements, distribution of benefits and immediate and long-term costs imposed on users all should be pre-assessed in the context of any latent or active social tensions, and designs should mitigate perceptions of unfair burden or exclusion.

Likewise, pressurised irrigation and protected agriculture can greatly increase returns to the scarce groundwater resource. Pressurised irrigation has proved efficient and profitable, although costs and risks are relatively high. Research and development, capacity building and technical cooperation could help design programs to increase efficiency and productivity, and to reduce barriers to entry and help farmers manage price risk (Ward & Ruckstuhl, 2017). Given the widespread depletion of groundwater due to overuse largely for pressurised irrigation, development of pressurised irrigation needs to be linked to consideration of how to strengthen groundwater governance. In fragile and conflict-affected contexts, decentralised and participatory approaches to groundwater governance (see section 4.2.2 above) can be linked to the agenda of technological improvement and productivity as part of a package to strengthen livelihoods sustainably.

Rainfed agriculture, the predominant farming mode in the Middle East and North Africa, is vulnerable to water scarcity, climate change, and degradation of soils, and increasing its resilience is a priority in many countries. New technology, investment and institutional adaptations are needed to raise productivity and to help farmers adapt to climate change. Three-quarters of rainfed cropland regionwide suffers from land degradation through salinisation, erosion, nutrient depletion and loss of soil structure. The causes are largely anthropogenic, and the costs are huge: an estimated USD 9 billion annually region-wide. Increasing soil resilience and reclamation of degraded lands is a priority in many countries (ITPS, 2015). As rainfed agriculture is typically the first sector to recover from crisis, programs for recovery should have a major focus on rainfed farming systems. These programs need to address not only short-term production responses but also the factors of long-term resilience.

Watershed management programs can greatly improve resilience, particularly in poor upland communities, and a new generation of replicable practices needs to be developed. Watershed management has been relatively successful in the region and across the world when approaches have been participatory, and conservation techniques have been profitable to farmers. Tests have identified successful models, but the challenge is scaling up sustainable approaches that can be carried on profitably by rural people themselves, building on experience and developing second generation programs (World Bank, 2008; FAO, 2015). When recovering from conflict, support programs that take a watershed management approach are ideal as they combine immediate income generation and poverty-reducing investments with longer-term water and soil conservation within a basin context.

4.4 BUILDING COALITIONS FOR RESILIENCE

Working together within countries and across boundaries is essential. Given the scale and commonality of the challenges, the relatively small size of many countries in the Middle East and North Africa, and the transboundary nature of important issues like climate change and shared water resources, collective action and partnerships are essential. Collective action will allow countries to learn together; to share data, best practices, and innovations; and to work through joint institutions. Sharing problems and sometimes difficult solutions among countries will also help develop a common consciousness among the peoples of the region and enhance the ability of governments to advance policy and institutional change (FAO, 2015). Again, countries affected by fragility and conflict can benefit both from the technology and from the practice of collaborating with neighbouring countries in the region.

4.4.1 Current Areas of Regional Collaboration

Over many years, regional collaboration in research has been strong and fruitful in the Middle East and North Africa, establishing a series of joint work initiatives. International agricultural research has been one of the shining examples of successful cooperation and has achieved significant impacts on livelihoods in the Middle East and North Africa. The work of the International Center for Agricultural Research in the Dry Areas (ICARDA) based in Syria has been particularly productive for the arid conditions of the Middle East and North Africa. The International Center for Biosaline Agriculture (ICBA) is doing pioneering work on cropping in marginal production systems (McDonnell & Ismail, 2011; FAO, 2011).

Some regional and international cooperation institutions also link countries in the Middle East and North Africa. The existence of multiple shared agendas has driven regional cooperation on land and water: economic linkages, shared land and water resources, common development challenges and climate change. Arab countries cooperate through the Arab Center for the Studies of Arid Zones and Dry Lands, with a comprehensive program of action, the *Arab Strategy for Water Security in the Arab Region*. There are regional initiatives to combat desertification, with countries in the Middle East and North Africa participating in international programs such as the UN Convention to Combat Desertification (UNCCD) and the Global Environment Fund (GEF) (FAO, 2011). The Arab Countries Water Utilities Association (ACWUA) is also an example of a regional platform for water and wastewater utilities from the region to exchange knowledge. Similarly, the Middle East and North Africa Network of Water Centres of Excellence and the Arab Water Council are other examples of cooperation and knowledge exchange on the topic of water management in the region. Many MENA countries, including Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Syria, West Bank and Gaza and Tunisia benefit from financial assistance and trade benefits with the EU under the European Neighbourhood Policy (ENP).

There are many themes where regional collaboration could build on existing and potential mechanisms to improve management of the scarce water resources in the Middle East and North Africa. Priority areas for regional and international cooperation, which can also serve to intervene in the fragility-water cycle, include knowledge sharing; disseminating best practices in governance and institution building; benchmarking; research and development;

capacity building; technical cooperation; and awareness raising.[5] Countries recovering from fragility will benefit not only from the technology but also from their readmission to solidarity networks among neighbours.

4.4.2 Optimizing Benefits from Transboundary Resources at the Basin Scale

Planning and investment done in a fully cooperative manner could yield greater benefits for countries that share waterways. The absence of an inclusive, cooperative framework has been a constraint for the optimal development of the region's major transboundary rivers (Nile, Tigris, Euphrates). Though it can still be a tough sell in some cases, there are shared benefits when riparian countries look beyond their borders and work together to optimise investment and use. However, transboundary management is complicated when riparian states are fragile or conflict-affected, as in the case of the Tigris-Euphrates. Establishing a manageable level of stability opens opportunities for transboundary collaboration. Recovery and development strategies can provide a gateway for initiating these discussions.

All Middle Eastern and North African countries share at least one aquifer with a neighbour. Countries in the Maghreb share a considerable proportion of transboundary groundwater resources. Libya and Algeria top the list regarding areal extent of shared aquifers (IGRAC, 2015). The current knowledge on the storage of these aquifers is uncertain, so it is difficult to estimate the volumetric percentage of a country's groundwater supplies that are transboundary. The first step to sustainable management of these shared resources is transparent development and exchange of information on these important water supply sources.

Cooperation could deliver fair distribution of benefits, economic efficiency and environmental sustainability. The ultimate goal is to conclude cooperative agreements on benefit sharing. The ideal is to achieve fair distribution of benefits, economic efficiency and environmental sustainability through agreement on some level of cooperation. The persuasive concept of benefit sharing – rather than assigning quantified water rights – could be at the heart of cooperation (Sadoff & Grey, 2002; Ward & Ruckstuhl, 2017).

Investments planned at the basin rather than the country scale can deliver win-win benefits for all. Overall, the benefits to be brought by cooperation are likely to be considerable, as reaching agreement over water reduces risk and encourages economically optimal investment for all countries involved. A cooperative framework can create win-win benefits, as planning and investment can be conducted at the basin scale, allowing upstream hydropower development, for example, while securing downstream benefits from irrigation and water supply (FAO, 2015). A cooperative framework also seeks to address contentious issues that may harm the interests of other riparian countries.

Examples of cooperative management of transboundary waters exist. Particularly significant is the Nile Basin Initiative which has promoted planning and investment at the basin scale

[5] The areas where collaboration would be most fruitful are discussed in the accompanying note.

and has attracted over USD 6 billion in new investment capital to transboundary collaborative projects (Ward and Ruckstuhl, 2017). For groundwater, the North Western Sahara Aquifer System is notable. These examples could inform development of cooperation on transboundary waters in other parts of the region (GEF, 2015). Many regional countries are signatories to relevant international conventions such as the Convention on the Protection and Use of Transboundary Watercourses, but significantly the more powerful riparian states have not signed.

There are many strategic and political constraints, but cooperation on transboundary waters could contribute to stabilisation and peace-making. From crisis may come solutions, as an equitable settlement on water may form part of a much larger political negotiation. As Iraq – and eventually Syria – attempt to rebuild their economies after a long period of war, water security will play a critical role in long-term development strategies. Transboundary cooperation on resource development and flows could make an important contribution to the recovery of these countries from war. Conversely, if this is not done successfully, water scarcity will feed grievances, pauperise the populations and contribute to continuing instability. Hence, international partners in the region and beyond have an interest in promoting transboundary cooperation. Benefit sharing on the Tigris and Euphrates could be a part of an international effort to plan recovery in these countries (Ward & Ruckstuhl, 2017).

Opportunities for transboundary peacebuilding also exist on a smaller scale and can lay the foundation for other levels of collaboration. One example of turning a problem into an opportunity is cross-border cooperation on natural resource management between Israelis and Palestinians. The one regional cooperative agreement that has been adopted – Article 40 of the Oslo Accords between Israel and the Palestinians – has failed to deliver the intended results of water security. However, lower level cooperation between civil society organisations in those two states shows that the potential of working together on natural resources can go further and can contribute to peacebuilding (Box 4.4).

BOX 4.4 Cooperation Over Water: Good Water Neighbours Project

The Good Water Neighbours Project (GWN), which brings together Israeli, Palestinian and Jordanian communities to collaborate on local shared environmental challenges, demonstrates the potential for peacebuilding in the context of water scarcity. GWN, launched in 2001, is an ongoing initiative of EcoPeace Middle East (previously known as Friends of the Earth Middle East). EcoPeace is a tripartite organisation, with offices and representation from Israel, the West Bank and Gaza, and Jordan. The objective of EcoPeace, and in turn GWN, is to promote peace through supporting good management of the region's shared ecosystem. On local and regional levels, GWN promotes sustainable water management through information sharing, dialogue, and cooperative ventures. It supports collective action on common water issues through transboundary partnerships between Israeli, Palestinian, and Jordanian communities. In 2006, EcoPeace, with the assistance of a local planner, began cooperatively mapping out environmental problems and sustainable solutions in collaboration with local communities. Today, the project uses public seminars and workshops, and implementation of small infrastructure investments (for example rainwater harvesting schemes) as ways to achieve its goals. GWN receives financial support from multiple sources, including Australia, Belgium, Canada, European Union, Japan, Sweden, Switzerland, United Kingdom, and the United States, and from nongovernmental organisations such as Caritas and the Ford Foundation.

Source: Ward and Ruckstuhl, 2017

CHAPTER 5

Conclusions

Countries in the Middle East and North Africa face great water and fragility challenges. This paper has described how water and fragility challenges interact with and compound each other. The paper has argued that improving water management practices and governance in the Middle East and North Africa can promote resilience in the face of protracted crises and fragility.

Stability in the Middle East and North Africa is a global public good and policy goal. Water can play a significant role in the broader social and political dynamics of the region. It is important to understand these dynamics better to ensure that water does not add to fragility, but rather promotes stability.

This paper is a first step toward addressing the growing challenge of water management in fragile systems.

5.1 RECOVERY AND RESILIENCE BUILDING IN THE WATER SECTOR IN FRAGILE AND CONFLICT-AFFECTED SYSTEMS

5.1.1 Recovery and Resilience in Water and Agriculture

Water and agriculture are key to recovery and stabilisation and, ultimately, to peacebuilding. As the home of a large proportion of the population of the conflict-affected countries, as the breadbasket, and as a reserve of peace and refuge in troubled times, rural areas have a prime role in helping populations to weather the crises in the region and to emerge from them. Typically, agriculture is the first sector to recover from crisis, because the factors of production, including water, can be more rapidly mobilised. Water and agriculture are also a key input to recovery. They are a first point of entry for mitigating the impact of conflict on food insecurity, poverty, employment and economic growth. Producing and selling food, generating rural incomes and employment, rebuilding household-level food security, supplying drinking water, and rebuilding social cohesion and institutions from the bottom up, water and agriculture are key to stabilisation and ultimately to peacebuilding.

From the outset, all interventions need to have an eye on building long-term resilience. Building resilience in water and agricultural systems in fragile and conflict-affected systems requires both the short-term and the long-term to be considered in planning from the very beginning, bridging the humanitarian-development divide. Actions that restore water services to both farmers and households are among the first steps to building this resilience.

Interventions need to be local level, inclusive, consultative, and bottom up. Because of the essentially local nature of the water and agriculture problems and intervention responses, community consultation, participation, and ownership are vital, as is working with whatever local government may exist on the ground. Leadership and ownership are also essential at all levels. Strategies need development in response to political and security concerns. Approaches need to fit within emerging national policies on water and agriculture (see section 5.2), but also contribute to constructing them. And through these inclusive approaches, the social compact will be strengthened.

Joint approaches, partnerships, flexibility and responsiveness are vital. Because of the complex nature of the challenges, building resilience requires multiple agencies to work together, with joint analysis and programming. Programmes need to be flexible considering experience and the evolving political and strategic situation. Requirements are time, financing, and mechanisms for analysis, evaluation, knowledge-sharing, and learning so that interventions can be improved and adjusted. These coordinated resources can strengthen interventions on the water-fragility cycle.

Highly visible improvements in drinking water supplies and services contribute to the renewal of the social contract in fragile contexts. Accordingly, water sector interventions should prioritise protection of critical water infrastructure and water sources, alongside improvements in the delivery of water services to conflict-affected and displaced communities. These developments will contribute to improving living conditions in communities, both rural and urban, as well as helping restore confidence in government institutions.

5.1.2 Harnessing the Opportunities

The challenge is to address the longer-term issues like water resource sustainability at the same time as immediate livelihoods and food security challenges. How can resilient livelihoods, agriculture, and food security be rebuilt in countries affected by conflict? And how can the longer-term structural issues of equity and efficiency, employment, gender and social inclusion, and the sustainable use of natural resources in rural areas be addressed? Longer-term natural resource management issues such as water resource sustainability and watershed management need to be addressed at the same time as immediate livelihoods and food security challenges.

Interventions need to be adapted to each local situation and to address not just the short-term problems but also the long-term systemic issues that fuel the water-fragility cycle. There will be no one way to intervene, especially as the situations in conflict-affected countries in the region – and in the spillover effects in neighbouring countries – are so varied. Additionally, the intensification of the conflicts and the sustained migration flows have not only created short-term crises but also exacerbated some of the pre-existing structural vulnerabilities in all these countries. Interventions need to be tailored to each specific location and to address not just the short-term problems but also the long-term systemic issues that contribute to fragility and which escalate the effects of the water crisis.

A first pathway would be to improve food security and nutrition through support to smallholder crop and livestock production. These improvements would include restoring basic access to water for agriculture. The immediate aim would be to reduce vulnerability, thereby contributing to easing tensions and peacebuilding. An example would be the FAO project in Iraq, Increasing Profitability of Livestock Production, which targeted resilience to drought and market volatility by providing cash for work for both internally displaced people (IDPs) and host communities. The programme provided good incomes to support households through lean times and constructed useful communal productive assets, notably livestock watering points to sustain the livestock economy, helping to rebuild community institutions and social cohesion.

Steps along this pathway would all target productivity, sustainable and efficient water management, and overall enhanced resilience of smallholder agriculture. In the longer-term, the objective would be to help develop efficient, equitable, and sustainable food systems and food security for all, strengthen integration and efficiency along the value chain, reduce losses and wastage, and ensure that gender considerations are integrated. Strengthening of sustainable water management for crops and livestock would be integral to this. More broadly, the long-term goal would be to maximise the productivity and resilience of smallholder agriculture and to get smallholders integrated into commercial value chains. Restoration of water systems on an equitable and sustainable basis for both human use and potable water will be a critical component of action in this phase.

A second set of approaches would aim to promote sustainable livelihoods and employment opportunities. The immediate objective would be to ensure that small-scale producers, communities, and displaced populations have increased access to agriculture-based livelihoods and employment opportunities. Again, in this arid region, livelihoods all depend critically on restoration of water systems and maximising water productivity. An example of an intervention that achieved this short-term objective but also contributed to other development goals was the FAO project in Jordan, Improving Rural Livelihoods and the Environment (Box 5.1). Beyond short-term interventions such as this one, the longer-term goal is to ensure a more diversified rural economy with decent employment opportunities for all and especially for youth and women.

Box 5.1 The FAO Project in Jordan: Improving Rural Livelihoods and the Environment

The FAO project in Jordan, Improving Rural Livelihoods and the Environment, achieved the short-term objective of promoting sustainable livelihoods and employment opportunities but also contributed to other development goals. The project targeted communities that were experiencing environmental and water scarcity problems, but which were also obliged to host a very large number of Syrian refugees. The concept was to use organic solid waste to produce renewable energy and compost. The project promoted labour-intensive processes for generating renewable energy through adoption of sustainable waste to energy and waste to compost practices. The project brought the multiple economic gains of reducing greenhouse gas emissions, reducing the costs of solid and liquid waste disposal, providing low cost, off-grid energy, generating green jobs, and raising agricultural and water productivity through use of compost. The effect, however, went beyond that, as the success of the project helped to weave the social fabric back together and create a positive relationship between local people and refugees.

A goatherd tends his flock.
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Sustainable use of natural resources is a third axis. Beyond the near-term objective of restoring water infrastructure – for example, rehabilitating canals and irrigation schemes or strengthening dams – longer-term aims in water management are important. These include decentralisation and modernisation of irrigation, sustainable and more equitable use of groundwater, maximisation of crop or dollar per drop of water through efficiency gains along the whole value chain, and the inclusion of women in decisions on natural resources.

Another FAO project in Jordan, Reducing Vulnerability in the Context of Water Scarcity, adopted a three-pronged approach to help both refugees and local would-be migrants in disadvantaged communities, including both refugees and hosts. The project used cash for work approaches and combined water harvesting, conjunctive use of groundwater, and solar power for lifting irrigation water, so spanning short-term needs for household income and long-term objectives of a more diversified rural economy and sustainable use of natural resources.

Finally, all these changes need to be underpinned by strengthened capacity and institutions. A resilient, efficient, equitable and sustainable rural sector requires several things. Farmers who have the necessary knowledge. Local participatory institutions that act fairly in the interests of all socio-economic elements of society and the environment. Government that has the capacity to plan for the longer-term for water and agricultural systems that are resilient to risks and shocks and that provide optimal prosperity and employment equitably, efficiently, and sustainably. The emergence of these kinds of institutions will greatly strengthen rebuilding of the state and confidence in it.

These recovery and rehabilitation interventions need to be set within new strategies, including for the vital water resource. How structural change and institutional reform in the key water sector can be brought about even in fragile contexts emerging from conflict is the subject of the next section.

5.2 DELIVERING STRUCTURAL CHANGE IN THE WATER SECTOR OF FRAGILE CONTEXTS

5.2.1 New Approaches to Formulating National Programs for Water

Countries in the Middle East and North Africa have made great strides in improving water management in recent decades. Countries in the region have progressed on many fronts to improve water management. In agriculture, this has raised productivity, supported a shift to higher value cropping, brought many more farmers into the market, and strengthened household level food security through higher incomes, reduced dependence on subsistence crops, and improved market functioning.

Given growing scarcity and vulnerability, much more needs to be done and new and emerging approaches can help this happen. Growing water scarcity, rising farmer expectations, and the needs of the two-thirds of farmers in the region who are dependent largely on rainfall imply that further improvement in sustainable agricultural water management is imperative. Cities and industries stressed by a lack of reliable and adequate water show the need for change in the municipal and industrial sectors too.

Approaches combining water management solutions with building cooperation and dialogue between the state and civil society are essential in fragile and post-conflict contexts. Many of these approaches are a continuation and scaling up of existing changes: the governance and institutional measures, IWRM and the basin approach, supply and demand management, measures to improve water use efficiency and crop water productivity, and measures to improve the efficiency and viability of urban water and sanitation services. What is new for the coming years is not so much the lists of measures, but the approaches suggested for applying them. Four linked and innovative approaches could be adopted in the preparation of national agendas in water management in the Middle East and North Africa.

Evidence-based approaches can help identify optimal policies and persuade people that they need to be implemented. Evidence-based approaches employ benchmarking, monitoring, evaluation and reporting to identify the best measures to apply, to monitor results, and to feed the knowledge gained back into adjustments. The evidence-based approach can apply across the whole range of measures: policies and strategies; changes to institutions and incentives; and technical and socio-economic interventions. Solid and reliable data is needed, and information and knowledge exchange are needed in the region. Benchmarking of the performance of urban water utilities is an excellent example. Transparency and open data can be an important early goal, and sharing information is the best way to gain the understanding of the population and their consent to what may sometimes be difficult changes.

Sharing information and getting users involved creates ownership, common purpose and ensures that water services to all users are needs adapted. A second new approach is to treat water users as full partners in building policies and programs, which is particularly important in farming so that policies and programs selected correspond to the farmers' needs and constraints and have their consent and cooperation. Innovative approaches to farmer involvement can go beyond consultation to recognising their status as commercial operators

in the value chain: businesses not beneficiaries. Treating them as businesses has implications both for the value chain – farmers and farmer organisations working directly with suppliers and buyers – and for farmer and public agency accountability. For example, the public-private partnership of a public irrigation scheme supplying water to farmers involves a commercial contract of water services in exchange for payment of the value of those services. In the municipal and industrial sector, too, great value has been found in keeping consumers informed and involved, particularly where there are service constraints or tariff issues.

A partnership approach that draws on multiple sources and links across institutions and people can harness innovation and learning and promote collaboration in fragile contexts. Partnership approaches provide opportunities for effective synergies in innovation and learning. In so complex a field as agricultural water management, and in the enormous diversity of situations across the Middle East and North Africa, there is a strong advantage in seeking structured mechanisms beyond the national level to understand challenges and potential, to learn from experiences, and to innovate and scale up successful innovations. It is a process founded on the evidence-based approach and the primacy of the farmers' viewpoint, but it needs to bring together institutions and programs at all levels, from the local to the regional and global, and it needs to forge more effective partnerships and ways of collaborating. The approach can range from farmer-to-farmer exchanges in Farmer Field Schools, to exchanges of solutions among practitioners rather than through conventional capacity building (as with the exchange forums of the Palestinian Federation of Water Suppliers), to regionwide partnerships like the Arab Strategy for Water Security, and to global partnerships such as the CGIAR network.

Change will be easier using an inclusive approach because it is responsive to demand and considers all voices, including women, youth and the poor. An inclusive approach to change will create ownership and ease implementation. Recent years have seen the emergence of new ways in which change comes about across the Middle East and North Africa. Education and social changes have heightened awareness of water issues across broad constituencies, and a new political openness has encouraged inclusive debate. There is broader understanding that objective problems of scarcity, intersectoral competition, and climate change are worsening, and that water institutions are not always well-adapted to this changing context. Future programs for improving agricultural water management need to use inclusive processes of study and debate leading to consensus among stakeholders.

5.2.2 Drivers of Change: Why Would Citizens Support Change in the Water Sectors of the Middle East and North Africa?

More inclusive and consultative political and social processes in the region have created a context favourable to change. Responding to the challenges of water scarcity and climate change will require many changes of policy and programs. These changes will need to be introduced by policymakers but will only be feasible if there is popular support for the occasionally tough measures required. Is there likely to be the basis of support required? Several decades ago, governments and agencies decided all such things with a top-down approach, but in recent years almost all countries of the region have seen the rise of more participatory, consultative and sometimes democratic approaches. Although each country

context is different, it is possible to identify several changes in attitudes, in awareness of problems, and in institutions and power relations that, taken together, have created a context favourable to change in the countries of the Middle East and North Africa. Many of these factors are present in fragile contexts, even as they emerge from conflict. If harnessed and fostered correctly, these factors can lend great impetus to building policies, institutions, and, ultimately, a higher level of governance and accountability between state and people.

Urbanisation and social change have created changing patterns of demand, more vocal constituencies, and more awareness within governments of the need to manage water scarcity. The thinking about water among different constituencies in the region has changed. Demographics and economic growth have led to a rapid urbanisation and increased consumption of water and water-intensive food products. As a result, urban constituencies across the region are now an important voice in water. Accompanying this change, education and broader social change, including in the status of women, have led to more emphasis in the region on potable water and safe sanitation, and less emphasis on water for agriculture. Government thinking has evolved, too, and policies which in the past favoured supply increase and tended to skew demand through subsidies and protection have moved more toward concerns for efficiency, environmental protection and reduction in the fiscal burden.

The growing water problems and climate risks have alerted all parties to the pressing need for change. These changes in attitude have accompanied the emergence across the Middle East and North Africa of serious water problems that are now the subject of open discussion. The groundwater revolution has led to unmanageable overexploitation. The rapid expansion of supply investments has created an inflexible pattern of rights and expectations. Climate change is introducing costs and risks that are hard to manage. There is awareness that management of environmental degradation has been neglected. Public and private investments in water infrastructure are altering existing water rights, in some cases increasing inequity, which has contributed to tensions and even conflict. Civil turmoil and conflict have heightened awareness of these issues among the population in fragile contexts, and there will be strong pressure in any post-conflict settlement to see them addressed.

There is recognition that past governance and institutions are sometimes poorly adapted to the changing and deteriorating context. There is an awareness that water sector institutions are not always adapted to the changing context. New technology and the development of resources, particularly groundwater, have outstripped the governance mechanisms that should have regulated them. More generally, there is a sense that governments have developed the resource and allocated water between sectors and to users but have not fostered the flexible and participatory institutional mechanisms and accountability structures needed to respond to changing demand, create accountability, or resolve conflicts. There is an awareness, too, that access to water is not always equitable, and that vulnerable and marginalised groups are most at risk as they lack the resources to manage the systemic factors that contribute to poverty. This recognition can drive a reform agenda for water during recovery and reconstruction.

There is thus receptivity to change, and this change may trigger a decisive moment. All these developments create a climate receptive to change, and this may be given an impulse by some decisive moment. Crisis can focus attention on lingering problems and trigger beneficial

change by sudden, dramatic events. For example, riots in Algeria in 2002–04 were a stimulus to acceptance of water reforms. Conflict in the Islamic Republic of Iran has demonstrated the need for a more consultative approach to relocation issues. Successive severe droughts in Morocco in the early 1980s stimulated water policy reform, including the approval of the 1995 Water Law. A long interruption in urban water supply in Ta'iz, Yemen, in 1995 triggered a national debate and the start of water sector reform (World Bank, 2007). The kinds of turmoil experienced in the region in recent years are an extreme example of a decisive moment and can be seen as an opportunity for discussing and agreeing far-reaching changes in how water is managed.

5.2.3 Building Momentum for Change[6]

Lessons from the decade-long Australian water reform program show how similar processes may be conducted in the Middle East and North Africa. Experience from elsewhere in the world can show how a program of best practice changes in the water sector can be decided and implemented by consensus. Australia has many characteristics similar to the countries of the Middle East and North Africa regarding aridity, water shortages, and stresses between sectors competing for water. Over a decade, Australia debated its water problems and developed a comprehensive reform program of water management. Lessons from both the content and the process of the Australian reform program provide indications of how similar processes of policy debate and reform may be conducted in the Middle East and North Africa.

Australia developed a National Water Initiative that targeted three objectives common to many countries in the Middle East and North Africa: to return all water systems to sustainable levels of extraction, to manage groundwater sustainably and to respect needs for environmental water. Beginning in the 1990s, Australia conducted an inclusive process of study and debate to arrive at consensus on a national water reform agenda, the National Water Initiative. This comprehensive reform plan sets three goals for water resources management which find echoes in many countries of the Middle East and North Africa. Three goals were also set to improve water allocation: providing secure water entitlements for irrigators, securing water entitlements for the environment and introducing water sharing plans with legal force. The provisions for demand management encourage open trading of water rights, introduce water pricing based on economics and ensure support for affected communities where there are fewer irrigation supplies. Strengthened governance and institutions play a key role, with investment in knowledge about water, building of capacity for good water management, and improvement of water data collection and water accounting. Finally, the Initiative provides for better water services, particularly in improved management and security of urban water supplies.

With a coherent national narrative for water reform, the Initiative has led to greatly improved water management. The changes have created certainty for water investors and

[6] This section draws heavily on the work of Ken Matthews AO, former Chairman and CEO, Australian National Water Commission and is adapted in part from his presentation "Water Reform in Australia – the Key Success Factors, a presentation by Ken Matthews, 8 June 2011."

communities, built up markets in the water sector, and opened the door for the private sector in water. Water management now integrates science, evidence and the requirements of the environment. Capacity for good water management is being built, and water is now fully integrated into the national infrastructure program.

There was a water crisis which triggered an inclusive and transparent debate leading to consensus on a coherent package of evidence-based reforms which prioritised good governance and institutions. The question is: what were the elements in the process which enabled Australia to bring about such sweeping reforms? The key factors in this success have been fivefold. First, there was an imperative for reform: Australia was experiencing severe water shortages, and overallocation to agriculture and the situation was worsening with climate change. These realities became drivers of change, the triggers that drove policy action and led to consensus that change was needed. Second, an inclusive process was used to bring consensus on a national water reform agenda: a long process of study, national debate, and political discussion led to agreement on objectives and on the National Water Initiative, which acted as a blueprint for the changes. Third, taken together, the policies were acknowledged to be coherent. The National Water Initiative contained the right suite of policies to achieve the policy objectives and the right measures to tackle the many water challenges within a coherent, integrated national plan. A fourth factor was the good water governance arrangements. The reforms established the right institutions, with clear authority and the necessary resources. Finally, the process was transparent and evidence-based. The National Water Initiative was based on the systematic use of data, science and knowledge, and on the practical application of economics, taking account of key concerns such as property rights, and introducing the discipline of markets.

One clear lesson from the Australian experience is that governance and institutions matter. From the outset, the Initiative adopted this principle: governance and institutions are always critical to good water management and the success of reform. As a result, institutional change and strengthening were at the heart of Australia's water sector reform. Reform of government agencies comprised:

- creation of a federal water department and legislation where there previously was none;
- establishment of a new independent authority for the Murray-Darling Basin;
- intergovernmental coordination committees;
- oversight by the Council of Australian Governments (Prime Minister and State Premiers); and
- an independent public assessor of progress (the National Water Commission).

Law requires the National Water Commission to report on reform progress. It reports to the Prime Minister and publishes independent assessments and reports. It can suggest new reform needs and has done so, for example on groundwater, water data, and water science. The Commission can advocate further policy and institutional change, and it invests in studies and promotion of further reform.

The institutional reforms were comprehensive, across the water sector. Specialist institutions were set up or strengthened: catchment management authorities; environmental water

managers; irrigation and urban supply utilities; environmental regulators; health regulators; and water market regulators, all of which were administratively separate. There was also emphasis on institutions to build capacity for data acquisition. A new agency, the Bureau of Meteorology, was set up. There were major investments in water science and water data. A massive public communications program was undertaken under the aegis of the National Water Commission to promote public debate and understanding about water.

Similar problems exist across the Middle East and North Africa, and several countries have shown the potential and social and political acceptability of similar reform processes. Although it is unlikely that any one country of the Middle East and North Africa could precisely replicate the Australian success, there are many lessons for both the content of reforms and for the process by which they may be brought about. The five key elements that underwrote the Australian process are relevant or possible in many situations in the region. Many imperatives for reform exist, and scarcity and climate change create a whole host of challenges. The inclusive process that was helpful in Australia in getting to consensus on the water reform agenda is practised already in some countries of the region: recent examples include Jordan and the Republic of Yemen. Some of these processes have satisfied the Australian condition of being transparent and evidence-based, employing data, scientific knowledge, and the practical application of economics. If these processes have not always produced the optimal result, they do at least show that the processes are politically and socially acceptable ways of diagnosing problems and highlighting solutions.

Some aspects – coherence of policies, strengthened governance – will inevitably be challenging, but water reform in the Middle East and North Africa is a long-term process. Two elements of the Australian experience may be harder to replicate in the Middle East and North Africa. One has been relatively weak so far in the region: coherence of policies. Knowledge is good, and the need is pressing, and as John Maynard Keynes said, "In the end we will do the right thing, even if only after exhausting every possible alternative." Second, the Australian experience benefited from strengthened water governance arrangements. Although institutional change in water in the Middle East and North Africa has been impressive in recent years, there is still some way to go to make the creative, rapid, and costly institutional reforms introduced in Australia. Nonetheless, this kind of reform remains a long-term must, and the itinerary is clear so that all incremental reforms are steps toward the long-term goal.

With the right support, post-conflict nations of the Middle East and North Africa could work out a new water agenda through consultation processes. Fragile and post-conflict states in the region face many of the same challenges in the water sector as Australia, and they possess at least some capacity to launch a consultation process of reform as Australia did. Most of these societies have age-old traditions of discussion and consensus-building. The shock of conflict has created a heightened awareness of the need for change and of the shape of that change. Structured support during the recovery period could help those nations develop a new water agenda that is sustainable, equitable, and economically efficient. The process itself could form a valuable part of rebuilding the nation, and reconstructing confidence between people and their state.

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WATER MANAGEMENT IN FRAGILE SYSTEMS

BUILDING RESILIENCE TO SHOCKS AND PROTRACTED CRISES IN THE MIDDLE EAST AND NORTH AFRICA

CONTACTS

Pasquale Steduto
Delivery Manager of the Water Scarcity Initiative and Regional Strategic Programme Coordinator for the FAO Regional office for Near East and North Africa
pasquale.steduto@fao.org

Anders Jägerskog
Senior Water Resources Management Specialist at World Bank
ajagerskog@worldbank.org

Policy makers, water resources managers, irrigation developers and financial institutions are invited to provide their views and feedbacks to our dedicated e-mail:
WSI@fao.org

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