

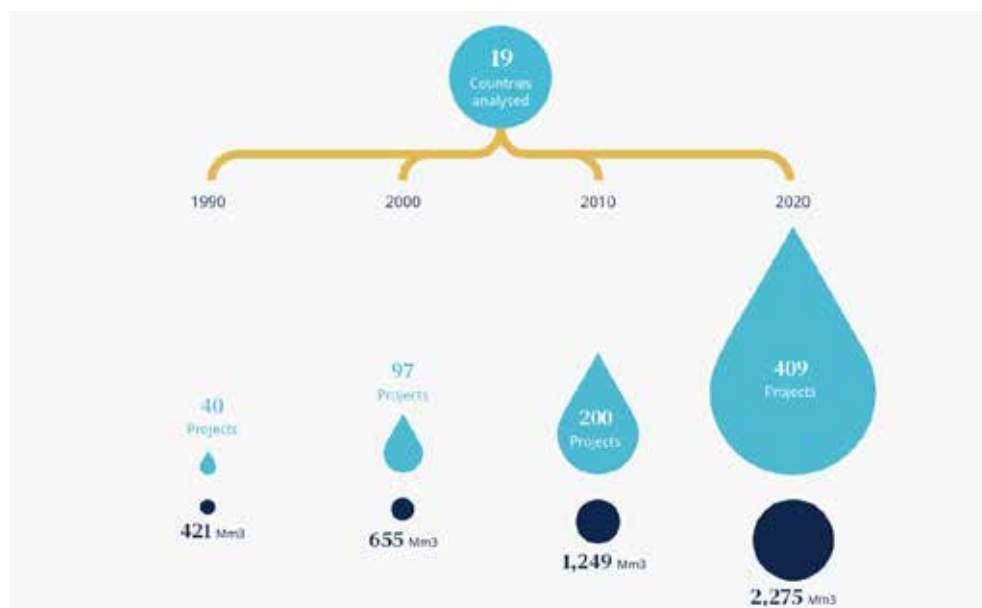
# Section 3

## A selection of outstanding water reuse cases in MENA

### Introduction

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The MENA region has been proactively investing in water reuse in the last decades. According to the [ReWater MENA](#) database the number of water reuse projects has doubled every decade since the 1990s. In the 19 MENA countries that were analyzed the number of reuse projects has specifically grown from 40 in 1990, reusing a total quantity of 0.421 billion cubic meters (BCM); to 97 projects in 2000 (0.655 BCM directly reused); 200 in 2010 (with 1.249 BCM); and finally, 409 in 2020 (with 2.275 BCM) (Figure S3.1). In the last decade, the growth in the number of projects of direct water reuse has been particularly high in countries like Saudi Arabia, United Arab Emirates, Qatar, Oman, Egypt, Algeria or Morocco.



**FIGURE S3.1** Evolution of direct water reuse in MENA; the number of reuse projects.

Nevertheless, the spread of projects on direct water reuse is uneven across the MENA region even though the region is one of the most arid and water-scarce regions in the world. Some countries, such as Jordan and Tunisia, promote wastewater treatment and reuse as an integral component of their water management strategy. Other countries, such as Lebanon, have not given priority to wastewater treatment or reuse.

Although water reuse in the region is currently limited, there are noteworthy water reuse success stories at different scales. Factors that contribute positively are political will and support, participatory stakeholder processes, economic and finance models, flexible reuse safety plans, effective policies, innovative partnerships, technologies and cost-effective investments that promote reuse. This body of knowledge provides opportunities for cross-learning to find solutions for common regional reuse challenges.

The dominant uses of reclaimed water are for forestry, agriculture and landscaping, including irrigation of parks and gardens. Each country of MENA has invested in different typologies of water reuse that best suit its needs and constraints. Forestry and agriculture are the dominant users of reclaimed water for example in Egypt, Tunisia and Jordan while landscaping is the preferred option in countries like Morocco, United Arab Emirates, Oman and other GCC countries. The pattern in other areas is not so clear with a more mixed project portfolio. These patterns are a consequence of different factors, including perceptions about reuse, the quality of the effluents and the different policies and legislations that have been shaped across the region.

The presence of water reuse projects for other purposes such as industrial use, non-potable urban use, aquifer recharge or environmental restoration are scattered and much less frequent.

In this section we have characterized in detail several key water resource projects from Morocco, Tunisia, Jordan, the West Bank and United Arab Emirates (Figure S3.2). The objective of this task is to make a full characterization of selected reuse cases, document the key factors that made them a success and the lessons learnt when things did not go well.

We selected nine case studies out of the 409 projects that ReWater MENA identified. The nine case studies met the following criteria:

- Have operated at scale for at least two years
- Have sufficient data available and accessible
- Are financially sustainable
- Generate positive social externalities
- Ensure human health protection and
- Generate positive environmental externalities

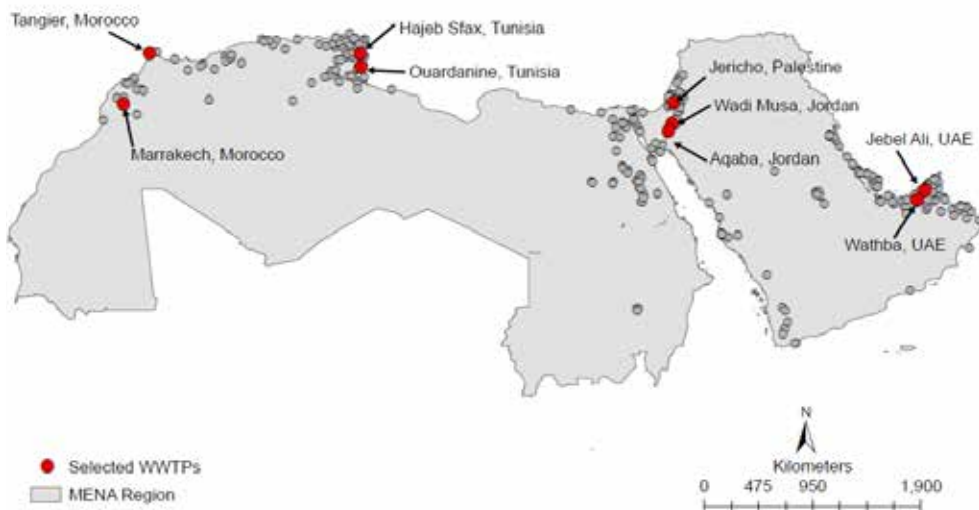
The selection also considers a balanced geographical distribution of cases that capture the regional differences and socioeconomic contexts.

**Case studies 1 and 2** examine wastewater treatment plants (WWTP) in Morocco. The first study examines a WWTP which serves a million inhabitants of Marrakech. The WWTP has made it possible to use recycled water in novel and innovative ways including to irrigate golf courses, green landscaped areas, the palm grove and 26 gardens and parks in Marrakech city. It has been successful in offsetting a water deficit in the Tensift basin and alleviates pressure on conventional water sources. The reuse of this water, which is treated to a very high standard, is contributing to the health of the people and the environment.

The second case study in Morocco looks at the Boukhalef WWTP, which was constructed to increase capacity in wastewater treatment and to provide irrigation water for green spaces in Tangier city. Operational since 2015, the plant saves nearly 3 million m<sup>3</sup>/year of water and improve the health and living environment of residents and bring additional benefits for promoting tourism.

**Case studies 3 and 4** present examples of WWTPs in Tunisia. The Sfax Sud WWTP serves a population of around 526,800 people and is located 6 km south of Sfax city. Water from the WWTP is used to irrigate the public irrigated perimeter of El Hajeb, an agricultural area of 444 hectares.

The second case study in Tunisia is similar to the first as recycled water from the Ouardanine WWTP is used in the Ouardanine public irrigated perimeter. The 74 hectares of the perimeter is owned by 42 farmers. The Ouardanine perimeter is an active location for scientific research and studies on irrigated agriculture in Tunisia and the first at the national level to use sludge as organic fertilizer.



**FIGURE S3.2** Selected cases of water reclamation and direct reuse for productive purposes in the MENA region.

**Case study 5** provided an in-depth analysis of the Jericho WWTP in Palestine. The Jericho WWTP started operations in June 2014 with the dual purpose of treating wastewater generated in the area and providing recycled water as a new source of irrigation water for date palm cultivation. The Jericho WWTP provides an attractive new non-conventional water resource that is already almost fully utilized for supplementary irrigation on date palm farms, representing 8–25% of the total irrigation water used for date palm cultivation in Jericho.

**Case studies 6 and 7** are from Jordan. Tala Bay WWTP started operations in 2005 to supply recycled water from the plant for use around the Tala Bay Hotels and Resorts complex to irrigate the landscaped spaces, for example, green areas and gardens. The water is pumped from the storage tank to be reused in different ways around the resort such as for the sprinkler systems to irrigate the green areas in the resort or to the drip network to irrigate the trees. Some of the recycled water is pumped to nearby hotels such as the Mövenpick Resort and Spa.

The Wadi Musa WWTP in the southern part of Jordan, close to the historic city of Petra, is owned by the Aqaba Governorate. It started operations in 2001 to serve 20,000 inhabitants and treat collected wastewater from hotels in Petra and nearby residential areas. The recycled water is used to irrigate an area used to grow alfalfa. It is the first community-based project established in Jordan.

**Case studies 8 and 9** look at WWTP in the United Arab Emirates. In 2011, two new treatment plants and facilities were constructed to boost wastewater treatment services in Abu Dhabi city and the surrounding areas. The Al Wathbah-1 and Al Wathbah-2 WWTPs were designed to fill gaps in existing treatment facilities caused by the increased volume of wastewater and to produce recycled water to use as irrigation water for farms, parks, green areas and similar around Abu Dhabi as part of sustainable water resource management activities. The catchment area for Al Wathbah-2 is below sea level. This has led to seepage of seawater into the collection network and results in high levels of salinity which is reflected in the salinity levels of water produced at the plant.

The Jebel Ali WWTP is the largest state-of-the-art plant in the United Arab Emirates and is located close to the city of Dubai. Water treated at the plant can be reused for non-potable applications across the Emirate of Dubai, with tertiary treated water mainly used for agricultural purposes. When combined with existing facilities, Jebel Ali WWTP will be providing sewage treatment for more than half of Dubai's 3.5 million population.