Chapter 23
Water Scarcity Best Practices and Innovation Pathways: Case Study of North Africa

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ABSTRACT

North Africa is limited in the north by the Mediterranean Sea, in the east by the Red Sea, in the west by the Atlantic Ocean, and in the south by the Sahara Desert. North Africa includes five countries: Egypt, Algeria, Morocco, Tunisia, and Libya. North Africa has a Mediterranean climate, which is characterized by mild, wet winters and warm, dry summers. Many areas in North Africa have faced water scarcity or water crisis, as well as the result of population pressures, rising urbanization, climate change, and also increasing pollution of water. All these factors have led to a rise in water demand and thereby to water shortage. In North Africa, rising temperatures and long droughts periods linked with climate change are expected to decrease the land areas suitable for agriculture and reduce crop yields. These are reflected in the increased consumption of freshwater. It is critical to understand a balance between water demand and water supply through an understanding of the impacts of climate change on freshwater and its direct consequences on water security.

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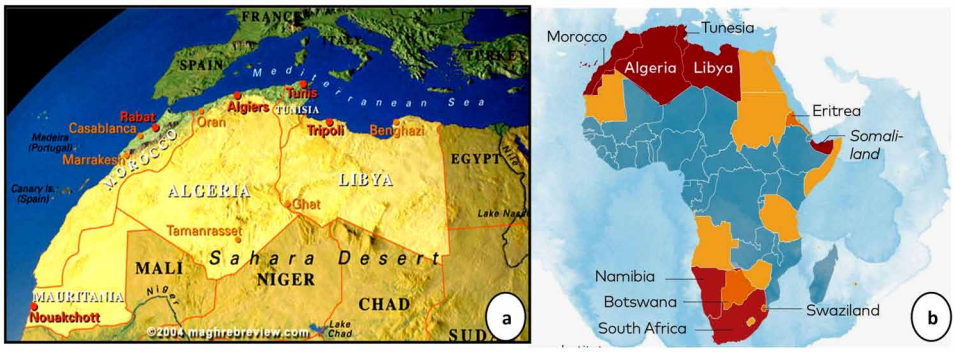
INTRODUCTION

Water covers ~71% of the Earth's surface, yet with such a vast reserve of water body on Earth, there is a global shortage of water. According to the WHO, in excess of 2.1 billion people worldwide, do not have access to on-premises sources of water, approx. 845 million people do not have access to a water source which are within about 30 minutes or less round trip and may not necessarily be always free from contamination or accessible when needed, 265 million people have to travel over 30 minutes just to access water that isn't even clean, and 159 million drinks from untreated surface water sources. It is further estimated that by 2025, more than half of the world population be living in water-stressed areas due to the formation of mega-cities and increasing world population, which is expected to reach ~9.7B by 2050, causing further stress on water globally. Although water scarcity is a universal phenomenon, this chapter is focused on the continent of Africa with approximately 1.37B inhabitants, spread over 54 countries (UN, 2019) and more specifically the region of North Africa. The five distinct regions of Africa include North Africa (5 countries), South Africa (6 countries), East Africa (contains 18 countries), West Africa (has 16 countries) and Central Africa (has 9). Northern Africa spans the largest areas of the African subregions and is including a total of five countries, viz. Egypt, Algeria, Morocco, Tunisia and Libya (Figure 1). Although, each country in Northern Africa has its own individual water resources, regional characteristics and water management history, notwithstanding, Algeria, Morocco and Tunisia have several similarities. A lot of data exists on the models and projections of water scarcity and as per World Resource Institute, a map of water scarcity is shown in figure 1b, with areas in red showing extreme stress.

Figure 1. (a): Map of North Africa (MSA, 2004). (b): As comparison projected water stress in Africa in 2040, as per Water Resource Institute.



According to a recent UN report (UN, 2020), more than 70 percent of population in Northern Africa already live in a water-scarce environment because of combinations of several factors, viz. population growth, climate change, and anthropogenic pollution. In addition to water stress, one of the serious difficulties facing North African authorities is in the regime of water scarcity management. It is currently at a crisis level and needs serious attention from stakeholders.