Focus Countries for the Study on Climate Change and Migration in the MENA Region

Burger, Nicholas and Grant, Audra and Kups, Sarah and Rana, Yashodhara and Wodon, Quentin

World Bank

June 2014

Focus Countries for the Study on Climate Change and Migration in the MENA Region

Nicholas Burger, Audra Grant, Sarah Kups, Yashodhara Rana, and Quentin Wodon

June 2014

This paper is forthcoming in:
Wodon, Q., A. Liverani, G. Joseph and N. Bougnoux, 2014 editors, *Climate Change and Migration: Evidence from the Middle East and North Africa*, Washington, DC: The World Bank.

Abstract

This study aims to be relevant for the MENA region as a whole, but it focuses on five countries - Algeria, Egypt, Morocco, Syria, and Yemen, and in many (but not all) cases on specific geographic areas within each of the five countries. After a brief introduction, this chapter outlines the reasons that led to the choice of the five focus countries. Next, to provide contextual background for the study, the chapter provides an introductory discussion of climate and migration patterns in each of the five countries, and of the policy and institutional context in which discussions on climate change take place.

1. Introduction

This study is about the impact of climate change on households, their coping mechanisms and their adaptation strategies, and especially migration. Migration decisions are influenced by a wide range of considerations related to climate change, including the risks of extreme weather events such as floods and droughts and the destruction they may cause, as well as the indirect effects of these and other events, such as lower agricultural yields, lack of water, and the health effects of excess temperatures. Understanding how climate change may impact migration is important to inform not only government and other programs to help households cope with and adapt to climate change, but also a wide range of investment decisions which must anticipate future patterns of mobility and settlements. Yet to-date relatively little is known about the extent to which households are affected by climate change in the MENA region, and whether climate change and extreme weather events have a large impact on migration decisions.

While this study aims to be relevant for the MENA region as a whole, it focuses on five countries - Algeria, Egypt, Morocco, Syria, and Yemen. In that context, the objective of this chapter is twofold. First, the chapter lays out the reasons that led to the choice of the five focus countries. The aim was to select countries which (1) had a large population to ensure that findings from the study to be illustrative (but not representative) of the relationships between climate change and migration for a large share of the MENA population; (2) were affected by changes in weather patterns and the environment, especially in terms of the frequency of droughts; (3) represented a wide array of socio-economic contexts in terms of the countries' levels of development, but with an emphasis on some of the poorer countries where the impact of climate change on households may be largest; (4) had other available data sources such as other household surveys or census data which could be used for complementary analysis[1].

Second, the chapter provides contextual background information on each of the five countries selected for the study. Information is provided first on traditional patterns of international and domestic migration in each country, and next on some of the challenges that the country is facing regarding climate change as well as the institutional framework in which policies related to climate change are being considered, and some of the programs and policies that have been adopted by the government as well as by non-governmental actors in this area.

The structure of the chapter is as follows. Section 2 outlines the reasons that led to the choice of the five focus countries. The next five sections provide contextual background for the study on each of the five focus countries. A brief conclusion follows.

2. Criteria for the Choice of Focus Countries

As mentioned in the introduction, four criteria guided the choice of the focus countries in which new data were collected. This section explains and reviews each of these four criteria.

Consider first population size. Table 1 provides population data for the top ten Arab countries by population size as of July 2012 according to UN estimates, as well as other variables such as population growth. Egypt, Algeria, and Morocco are the three most populated countries in the region, and are part of our sample of focus countries. Yemen and Syria rank seventh and eighth on the list. We did not choose Iraq because of the on-going tensions within the country. Sudan was not selected because administratively, it belongs to the sub-Saharan Africa region of the World Bank, and not to the Middle East and North Africa Region. Saudi

[1] In addition, the choice of countries was also informed by the on-going dialogue on issues related to climate change and migration between the countries and World Bank and the Agence Française de Développement, so that the study would be both welcome and more likely to be used.

Arabia was not considered because it is much wealthier (and less agrarian) than the other countries, and thereby has much more resources at its disposal to cope with and adapt to climate change. Iran is not listed in table 1 because it is usually not considered as an Arab country[2].

Table 1: Population Data for the Most Populated Arab Countries, 2012

Rank	Country	Population in 2012	Regional Share (%)	Growth (%)	Annual increase	Doubling time (years)
1	Egypt	83,958,000	22.55	1.72	1,444,000	41
2	Algeria	36,486,000	9.80	1.41	514,000	50
3	Morocco	32,599,000	8.75	1.01	329,000	69
4	Iraq	31,129,225	9.05	3.18	1,072,000	22
5	Sudan	30,894,000	12.28	2.44	1,116,000	29
6	Saudi Arabia	28,705,000	7.71	2.21	634,000	32
7	Yemen	25,569,000	6.87	3.10	793,000	23
8	Syria	21,118,000	5.67	1.70	359,000	41
9	Tunisia	10,705,000	2.87	1.05	112,000	66
10	Somalia	9,797,000	2.63	2.51	246,000	28
Arab world	Total	372,370,000	100.00	2.02	7,534,000	35

Source: United Nations population estimates.

Consider next vulnerability to climate change. As will be clear in subsequent chapters, while some households in the areas of focus of the study have been or are likely to be affected by floods, many more are affected by droughts. Without downplaying the threat of floods, the population affected by droughts is much larger. An analysis of vulnerability to droughts with a special focus on Syria, but with comparative data for other MENA countries was recently conducted by the Arab Center for the Studies of Arid Zones and Dry Lands and the United Nations Secretariat of the International Strategy for Disaster Reduction Regional Office for Arab States (ACSAD and ISDR, 2011). On the basis of data on drought frequency and consecutive droughts**,** the authors estimate that 69.1% of the area of the Arab region is not vulnerable to droughts, 14.45 percent has a low level of vulnerability, 10.98 percent is moderately vulnerable and 5.47 percent is highly vulnerable.

As shown in table 2, some of the countries most vulnerable to droughts are Syria (especially the north eastern area), Sudan (southern area), Tunisia (northern area), Algeria (northern area), Morocco (northern area), Somalia (north eastern area), Iraq (north eastern area), Saudi Arabia (north eastern area), and Yemen. The focus countries were chosen in part in order to represent conditions in different parts of the region, with Algeria and Morocco being part of the Maghreb, Egypt belonging to the Central Region, Syria located in the Mashreq and Yemen located in the Arabian Peninsula. Four of the five countries are among the most vulnerable to droughts in the region, and Egypt was chosen as the largest country in the Central Region and more generally in the Arab world, as discussed earlier. The ACSAD-ISDR study also emphasizes the fact that the drought vulnerable areas tend to be highly populated, with an estimated 54.69 million people living in areas under high stress from drought vulnerability, and another 91.3 million in areas moderately vulnerable to droughts.

[2] It is customary to consider four criteria when defining the Arab world: language, ancestry, religion, and culture. On all four counts, Iran does not conform to the characteristics associated with the Arab world.

Consider third levels of socio-economic development. The principle guiding the choice of countries was to focus on middle and low income countries, because these countries tend to have fewer means at their disposal than high income countries to be able to cope with and adapt to climate change (higher income countries are also of course affected by climate change, and often in dramatic ways, but their resources make it easier to protect the population from some of the damaging effects of extreme weather shocks). Also, middle and low income countries are more likely than high income countries to have net emigration flows internationally.

Our five focus countries include four middle income countries - Algeria (with a per capita GDP of US$ 7643 in 2011 in US$[3]), Egypt (per capita GDP US$ 5547 in 2011), Syria (per capita GDP of US$ 4741 in 2010) and Morocco (per capita GDP of US$ 4373 in 2011), but they also include a much poorer country – Yemen, with a per capita GDP of only US$ 2060 in 2011 (all figures are from the World Bank's World Development Indicators). Differences in standards of living can also be illustrated through the under-five mortality rate in the various countries. The lowest rate is for Syria, at 15.3 per 1,000 live births, followed by Egypt (21.1 per 1,000 live births), Morocco (35.5 per 1,000 live births), and Algeria (36 per 1,000 live births). The rate is much higher in Yemen, at 76.5 per 1,000 live births.

Table 2: Areas within Arab Countries Vulnerable to Droughts

Country	Area in squared Kilometers	High Vulnerability	Medium vulnerability	Low vulnerability	No vulnerability
Algeria	2,381,741	4.53%	7.11%	9.62%	78.74%
Libya	1,759,540	0.55%	1.66%	6.07%	91.72%
Mauritania	1,030,700	1.42%	5.41%	13.27%	79.90%
Morocco	712,550	7.79%	17.51%	29.75%	44.95%
Tunisia	163,610	9.82%	27.52%	14.55%	48.10%
Maghreb	6,048,141	3.37%	7.01%	11.71%	77.90%
Djibouti	23,200	11.73%	14.58%	23.97%	49.72%
Egypt	1,001,450	0.43%	1.61%	7.71%	90.24%
Somalia	637,657	7.37%	47.28%	25.14%	20.21%
Sudan	2,505,813	10.02%	11.70%	17.72%	60.56%
Central Region	4,168,120	7.32%	14.73%	16.49%	61.46%
Iraq	438317	21.00%	31.47%	20.86%	26.68%
Jordan	89,342	2.69%	8.56%	14.15%	74.60%
Lebanon	10,400	17.13%	25.67%	16.45%	40.75%
Syria	185,180	26.69%	36.96%	14.58%	21.76%
Palestine	6,220	8.72%	36.85%	14.69%	39.74%
Mashreq	729459	20.04%	30.02%	18.33%	31.61%
Bahrain	741	-	-	-	-
Kuwait	17,818	11.46%	43.03%	27.79%	17.72%
Oman	309,500	0.68%	2.67%	11.92%	84.73%
Qatar	11,586	0.00%	40.48%	27.00%	32.52%
Saudi Arabia	2,149,690	2.91%	7.85%	17.13%	72.11%
UAE	83,600	0.99%	2.75%	11.75%	84.51%
Yemen	527,968	5.24%	9.73%	13.52%	71.51%
Arabian Peninsula	3,100,903	3.07%	7.84%	15.95%	73.14%
TOTAL	14,046,623 5	0.34%	10.68%	14.41%	69.57%

Source: ACSAD and ISDR (2011).

[3] In 2005 US$, adjusting for purchasing power parity.

Consider finally the availability of other data sources. Much of the work conducted for this study is based on data newly collected, but where feasible we also relied on existing data. Two of the five countries presented an opportunity of using existing data. First, Morocco had just implemented a national Household and Youth Survey between December 2009 and March 2010. The survey included data on migration as well as on various shocks affecting households and their ability to cope with these shocks. Fortunately, just before the survey went to the field, we were able to add a few questions to guide the analysis of climate change and migration. Second, we had at our disposal the latest census and the latest national integrated household survey for Yemen. These national datasets for Morocco and Yemen made it feasible to conduct analysis for the countries as a whole, thereby complementing the analysis of specific areas within the five countries on the basis of the data collected specifically for this study.

Overall, the combination of these four considerations together with information on the on-going dialogue between the World Bank, the Agence Française de Développement, and the various country governments, led to the choice of these five specific countries for the study. In what follows, we provide an introductory discussion of climate change and migration in each of the countries.

3. Algerian Context

As mentioned in the introduction, this section and the four sections that follow provide a brief discussion of migration and climate related topics in each of the five countries of focus. Starting with Algeria, consider first international migration. France has long been the primary external destination for Algerian emigrants. This continued to be true throughout the 1954-1962 War of Independence, and after the war, over one million Algerians who had fought on the French side moved to France. In 1973, the Algerian government formally suspended migration to France. The government viewed migration as a form of post-colonial dependence and anticipated sufficient labor demand from the petroleum sector (de Haas, 2007). Under this policy, mass labor migration was terminated but family reunification migration continued. Over the last decade, more Algerians, in particular highly-skilled individuals, have moved to a more diverse set of destination countries, in particular to Spain (Di Bartolomeo, Jaulin, and Perrin, 2010). In 2002, it was estimated that 1.3 million individuals (4.2 percent of the population) were living outside of the country. Approximately 85 percent of these emigrants were living in France and an additional eight percent in other European Union countries. By 2008, the number of emigrants has fallen to below 900,000 however. Since emigration flows increased over the same time period, this seems to imply that many Algerians chose to return to their home country.

Algeria has also become a destination for immigrants from sub-Saharan Africa (Sekkai, 2008), and special immigrant groups, such as Chinese workers working for Chinese companies (Temlali, 2010). Overall, there were around 100,000 foreigners living legally in the country in 2008 and probably three times as many illegal immigrants and refugees, most of them Sahrawis who fled from West Sahara in 1975 and 1976. Probably around 40 percent of foreign migrants see Algeria as their final destination, another 40 percent see it as a transit station on their way to Europe, and the remainder are refugees or immigrants who would like to return to their home country but currently don't have the means to do so (Temlali, 2010).

Internal migration within Algeria takes place primarily between rural areas and mid-sized towns, rather than towards large urban areas (Gubert and Nordman, 2009). In 2010, 66 percent of the population was living in urban areas, up from 60 percent in 2000. Urban areas have been growing at around 2.5 percent over that period, while the number of people living in rural areas

has been declining (World Bank, 2011). In addition to voluntary moves, during the Algerian Civil War from 1992 to 2002, at least one million Algerians were forced to move within the country. Many of these refugees have not yet been able to return home (EACH-FOR, 2008).
As in other countries, unemployment is a key driver of migration flows, including for the case of highly skilled individuals (Di Bartolomeo et al., 2010; de Haas, 2007). Although unemployment declined from 29.3 percent in 1999 to 10.2 percent in 2009, rates among under-30 year olds are typically twice as high as the national and even higher among young highly educated individuals (Ministry of Territorial Management and Environment [MATE], 2010). It is worth noting, however, that unemployment is on average higher among Algerian-born individuals residing abroad than in Algeria itself (European Commission, 2010).

Consider next the question of environmental degradation and climate change. The Algerian territory encompasses three main geographic regions: the Tell in the north, the high planes in the center, and the Sahara in the South of the country. The littoral region of the north is the most densely populated, with 63 percent of the population on four percent of the territory. One tenth of the population lives in the Sahara, which represents 85 percent of the territory. The majority of arable land (three percent of the territory), as well as the majority of industry are located in the coastal region, while the region of the High Plains dominated by semi-nomadic pastoral cultures. The coast and the Tellian Atlas are in a temperate climate zone, with warm summers and mild and rainy winters; the High Plaines and the Saharian Atlas have an arid climate, with low and irregular rainfall, cold winters and very hot summers; and the Sahara has a desert climate (MATE, 2010). Slow-onset environmental degradation is an issue throughout Algeria and the country is already subjected to water stress. Mean annual precipitation ranges from 800-1,000 mm in the East of the Tellian Atlas to 20-150mm in the Sahara. Since 1975, precipitation has gradually decreased, with currently only 600 cubic meters of fresh water per habitant and year, a level below the U.N. defined scarcity threshold of 1,000 cubic meters (MATE, 2010). Based on FAO data and World Population Prospects data, Fargues (2008) estimates that this amount will not drastically decrease until 2030, but it may decline after that.

Apart from water scarcity, another environmental problem affecting Algerian agriculture is soil erosion and desertification. In the Algerian steppes 3.5 percent of the land is already subject to desertification or being irreparably damaged, and more than 50 percent of the territory is either highly sensitive or sensitive to desertification (MATE, 2010). For the future, Cline (2007) estimates shortfalls in agricultural yields by 2080 ranging between 28 to 36 percent versus the baseline of 2003, while Rousset and Arrus (2006, cited in Gubert and Nordman, 2009) predict that by 2020, agricultural yields could decrease from 5 to 14 percent as a result of environmental problems exacerbated by climate change.

Extreme climate events are also frequent, with parts of the northern region of the country highly vulnerable to droughts (such as the several-year long drought of the early 1990s), cold waves (January 2005), flash floods (possibly associated with mud slides) due to heavy rainfall (in November 2001, October 2002 and October 2008), and heat waves (summer 2003). The consequences of these events range from large harvest losses and destruction of homes to deaths. For instance, in November 2001 the municipality of Bal El Oud in the region of Algier registered a rainfall of 290mm, 40 percent of the mean annual precipitation, in less than 17 hours. In the wake of this event, in this municipality alone, 712 people died, 115 had disappeared, 311 were injured, and 1454 families lost their home. Since 1975, both droughts and flooding have become more common, and there are concerns that this trend will continue in the future (MATE, 2010). On the other hand forest fires, which are only partly a result from the climate, have become less

common and severe since 2001, due in part to increased surveillance and the implementation of an early warning and intervention system (MATE, 2010). Despite being predicted to have the highest rise in sea levels in North Africa by 2030 (NIC, 2009) less than one percent of the population may be affected by sea level rises (Sowers and Weinthal, 2010).

Consider finally the link between environmental degradation, climate change, and migration. To our knowledge, no studies are available on how past environmental shocks have affected migratory movements in Algeria, or how they may be related in the future. A conference hosted by the National Intelligence Council concluded that Algeria is less economically vulnerable to climate change because a large percentage of its GDP (30 percent) is derived from oil and natural gas and because agriculture and tourism play a limited role for the country's economy (NIC, 2009), both in terms of GDP and labor force share (only 14 percent of the labor force is employed in the agricultural sector according to the CIA, 2011). This may suggest that climate-induced out-migration will not drastically increase due to climate stress. However, Algeria already has to import 45 percent of its food, a percentage that may increase in the future due to increasing desertification, soil erosion, and water shortages, so that climate change may exacerbate the food security situation, leading to refugee flows (Brown and Crawford, 2009).

In terms of the policy framework, Algeria has been party to the United Nations Framework Convention on Climate Change (UNFCC) since 1993, and it ratified the Kyoto Protocol in 2005 as a non-Annex I party country. In 1996, Algeria also ratified the Convention on the Fight against Desertification. Key government agencies include the High Council on Environment and Sustainable Development (Haut Conseil de l'Environnement et du Développement Durable) created in 1994 and charged with evaluating the environmental situation, develop strategies, and follow international policy. The Ministry of Territorial Planning and Environment (Ministère de l'Aménagement du Territoire et de l'Environnement) was created in 2000 and charged with implementing environmental policy. In particular, the ministry is tasked with preventing pollution, protecting biodiversity and natural spaces, promoting environmental education, and managing the National Environmental Fund, which provides funding for environmental protection projects. The General Environmental Inspection (Inspection Générale de l'Environnement) was created in 1996 to oversee the implementation of environmental policy. Other governmental agencies have related mandates, including the Agricultural Ministry and the Ministry for Water Resources. A Law for the Protection of the Environment and Sustainable Development has been adopted, as well as a National Action Plan for the Environment and Sustainable Development (Plan National d'Actions pour l'Environnement et le Développement Durable). The National Scheme of Territorial Management (Schema National d'Aménagement du Territoire) 2030 was approved in 2009.

In terms of projects, one traditional area of focus has been to implement a 'green barrier' (barrage vert) to reduce desertification and erosion through reforestation in the Saharian Atlas. A project was started in 1996 but halted in the late 1980s. Today, an important initiative is the National Program on Agricultural Development (Programme National de Développement de l'Agriculture) which aims to ensure food security, increase incomes and living standards in the rural regions, and manage scarce natural resources. For 2009 to 2014, 12,000 projects potentially benefiting 12 million people were planned (MATE, 2010). Initiatives to secure water supply include the building of 15 new dams between 2004 and 2009 and the planning of 13 additional ones, a pilot desalinization plant in Algier and plans to build 13 such plants across the coast, water recuperation, the building of channels, and a 65 percent increase in irrigated surfaces from 2000 to 2009 (MATE, 2010). The National Environmental Strategy (Stratégie Nationale de

l'Environment) for the 2001-2010 period includes an educational component, targeting for instance teachers and television stations as multipliers. A pilot project launched in 2002 with UNIDO funded environmental education in 50 schools, and since 2005, environmental education has become part of the school curriculum at the primary and secondary level at 1,000 schools.

Non-governmental efforts are also underway with funding or technical assistance from donors. For example, in partnership with the government and UNOPS and with funding from IFAD, local actors have defined a development plan for their mountainous region with the aim of reducing rural poverty. Canada's IDRC has funded a project on environmental and natural resources management capacity building to support local researchers through hosting a workshop and through a small grants program from 2003 to 2006. The IOM is planning a number of projects whose goals are to build local capacity for planning rural development and sustainable management of natural resources (including water and land), and to create stable and diversified income for rural populations. At the request of the national government, UNDP carried out a program formulation mission that sought to communicate with local and national private and public actors, and to define common guidelines by which these actors could manage their climate-change related projects. And the FAO has been running a Special Program for Food Security since 2005, with around 60 projects and covering around 5,300 households.

4. Egyptian Context

It is estimated that 2.7 million Egyptians reside abroad (IOM, 2010), 70 percent of whom are in other Arab countries, and especially Saudi Arabia (with 0.92 million Egyptians), followed by Libya, Jordan, and Kuwait. Among non-Arab countries, the United States is the most common emigrant destination, with 0.3 million Egyptian immigrants. Highly-educated individuals, such as doctors and engineers, are most likely to emigrate permanently (EACH-FOR, 2009a). In total, around five percent of the tertiary educated were living abroad in 2000 (World Bank, 2010). There are no reliable estimates of the extent of illegal emigration, but the EACH-FOR report states that *"there are tens – if not hundreds – of Egyptians who have been caught illegally attempting to cross the Mediterranean,"* and the 2007 EU-Egypt Action Plan contains some general clauses on cooperation on migration control (European Union, 2007). From 2000 to 2010, the number of foreign-born individuals living in Egypt increased from 170,000 to 245,000 (World Bank, 2011). However, these figures are likely to be underestimates. Immigrants include labor migrants from Arab and African countries, Europe and the United States, and refugees from Palestinian, Somali, Ethiopian and Eritrean nationalities (Zohry, 2006).

The most important internal migration flows are from the south to the north, from both south and north to the Canal Zone, and from rural areas to Cairo and Alexandria (Zohry, 2005). Over the past decade the urban population growth was at 1.9 percent, which is similar to the national average, so that urbanization remains just below 43 percent. Reasons cited for historic migration include rising population density in areas where agriculture could not be expanded further geographically, decreasing economic opportunities, and unemployment. In addition, involuntary migration occurred in response to the 1967 Arab-Israeli war, which displaced 750,000 people, and to the construction of the Aswan Dam, which displaced 100,000 people, primarily of the Nubian ethnicity. While temporary and circular migration−traditionally very important−continues to occur, it used to be driven by seasonality, with primarily agricultural workers moving to cities when there was no work for them in rural areas. Today, the seasons appear to have much less of an influence on these circular moves (Zohry, 2005).

Egypt has a primarily desert climate. During the winter there are some rains and mild temperatures in the coastal areas of lower Egypt, while upper Egypt is dry with warm weather. In the summer, the entire country experiences hot and dry weather (EEAA, 2010). From 1961 to 2000, mean temperatures were steadily rising, and in Upper Egypt and the Western Desert, the number of days on which temperatures equaled or exceeded 45 degrees Celsius (113 Fahrenheit) increased. The severity and frequency of extreme weather events—including sand storms, dense haze, and flooding—have also been increasing over the 1972 to 2002 period.

Some eighty percent of the water is used in the agriculture sector, which accounted for 13.8 percent of GDP in 2006/2007 and employed 55 percent of the Egyptian labor force (EEAA, 2010). Because 95 percent of Egyptian agriculture is irrigated and all but five percent of Egypt's water supply comes from the Nile River, the impacts of climate change on temperature and precipitation levels and on Nile flows are of vital importance. Under three global circulation models, it is estimated that Nile flows could either decrease by between 10 percent and 75 percent or increase by one third relative to the 1996 level of 84 billion m3 (EEAA, 2010). In another paper, ten out of ten scenarios predicted losses from 5 to 50 percent in 2020; and nine of ten scenarios predicted long-term decreases between 10 to 90 percent by 2095 (Strezpek et al., 2001, cited in EEAA, 2010). While Egypt is relatively well equipped to deal with one-year droughts through the water stored by the High Aswan Dam, long-term decreases in Nile flows would be a major problem (Agrawala et al., 2008). In addition, it is estimated that solely through the expected rise in temperature the production of major crops will decrease – for instance for rice by 15 percent by 2050 and by 36 percent in 2100 (Abou-Hadid, 2006, in EEAA, 2010). Land degradation through pollution and salinization may further negatively affect agricultural output (EACH-FOR, 2009c).

With a 3,500 km coastline and much of the economy and population being concentrated in these areas, sea-level rises will also have an impact. For instance, El-Raey et al. (1999, in EACH-For, 2008) estimates that a 0.18 meter rise would lead to a loss of employment of 32,000 and a rise in half a meter would lead to a loss of 195,000 jobs in Alexandria; and in a recent presentation by Shalaby (2010), it is argued that sea level rises may reduce the Egyptian agricultural area in the Nile delta by 12-15 percent. An environmental factor that is already displacing people today—and which is likely to become more severe in the future—is desertification. Advancing sand dunes in the Western desert are swallowing entire villages, forcing their inhabitants to move (Warner et al., 2008). Thus, Warner et al. found that more than 70 percent of internal migrants that they interviewed in the Nile Delta and Valley, newly reclaimed desert and slums in Old Cairo named land degradation and water shortages as root causes in their migration decision. Another environment factor that may cause future migratory movements is a rise of the sea level. Dasgupta et al. (2007, in EACH-FOR, 2009b) predict that a one-meter sea-level rise would displace around 10 percent of the Egyptian population.

Demographic pressures may further influence future migration flows. It is projected that that Egypt's population, which in 2006 was approximately 77 million, will increase to 92-100 million by 2020 and 104-119 million by 2030 (EEAA, 2010). This population growth will put strains on the environment, for instance reducing the available water per capita from 1000 m^3 in the early 1990s to 468 m^3 in 2030, assuming that Egypt will continue to be able to get its current fixed share of Nile water as was laid out in a water sharing agreement in 1959 (EEAA, 2010).

The policy framework regulating the use of water from the Nile dates back to a 1959 agreement between the Nile states establishing fixed water quotas. In addition, the Nile Basin Initiative was launched in 1999 with the aim to *"achieve sustainable socioeconomic development*

through the equitable utilization of, and benefit from, the common Nile basin water resources", such as planning projects on the efficient use of water (EACH-FOR, 2009b). Egypt ratified the United Nations Convention to Combat Desertification in 1995 as one of the first four countries to do so. The main obligation under the Convention is the formulation of National Action Programs, which Egypt has done in 2005. Egypt signed the UN Framework Convention on Climate Change in 1992 and ratified the Kyoto protocol in 2005. As a non-Annex I party country, Egypt is required to submit national communications. A climate change unit was established in 1992 within the Egyptian Environmental Affairs Agency (EEAA), the executive arm of Egypt's First Minister of State for Environmental Affairs. Its goal is to coordinate all national and international activities related to climate change. The National Committee on Climate Change headed by the Minister of State for Environmental Affairs was established in 1997. It oversees national policies regarding climate change. A variety of other bodies, such as a National Authority for the Clean Development Mechanism, ministerial committees for climate change within the ministries of Agriculture and of Water Resources also exist (EEAA, 2010).

An important project under implementation for some time is the New Valley Project with four 5-year development plans laid out from 1996 to 2017. Under the project the Ministry of Housing, Utilities and Urban Communities was to construct new cities in the Western desert, and millions of Egyptians were to be resettled. This would have extended the populated area from 4 to 25 percent of the territory. Five cities were constructed from 1996 to 2006 and other cities were restructured and extended (EEAA, 2010). However, even though soil quality in the region is very good, it is one of the hottest places in Africa, and water evaporation and soil salinization are threats (EACH-FOR, 2009b). Individuals who have already moved to the region have noted these issues, and also complained about a lack of key infrastructure. Another project is led by the Ministry of Agriculture and Land Reclamation and the Ministry of Water Resources and Irrigation. The two ministries have developed a plan to reclaim 3.7 million acres of land by 2017, with the required water being procured through a more efficient water use and increasing the use of non-conventional water resources (EEAA, 2010). The Ministry of Agriculture and Land Reclamation, in collaboration with the IFAD and FAO, also develops stress resistant crops and disseminates information in response to climate change.

Due to a growing population, per capita fresh water resources are likely to decline even without decreases in Nile water flows. In response, the 2005 Water Resource Plan by the Ministry of Water Resources aims to improve the irrigation system, change cropping patterns, and support weed control, rainwater harvesting, desalinization, etc. (EEAA, 2010). The plan, if successful, could increase irrigation by 50 to 75 percent, and the ministry collaborates with UNESCO in the forecasting of climate change impacts on the Nile flow. Also, compared to other developing countries, Egypt is very engaged in coastal vulnerability assessments, and in carrying out adaptation procedures that respond to current threats, such as beach nourishment projects in Alexandria and the reinforcement of a sea wall. However, relative to the magnitude of changes that may be expected in the future, these projects are not yet sufficient (Agrawala et al., 2004). Finally, in its second national communication under the UNFCC, the EEAA outlines further adaptation, project and research needs and the need to establish a Ministerial Committee headed by the prime minister that would review literature, develop a draft policy for addressing climate change, and develop four five-year plans (EEAA, 2010).

Many international organizations are supporting governmental and non-governmental efforts in various ways. As done for Algeria earlier, a few examples include support the UNDP Global Environmental Facility Small Grants programme, with 60 percent of the 175 grants that

were allocated carried out by non-governmental organizations (EEAA, 2010). UNDP also provides expertise to various Egyptian governmental agencies for instance on renewable energy and energy efficiency and on the financing of environmental projects, and on crisis and risk management. The UNHCR carries out activities related to refugees in Egypt, on the basis of a 1954 framework agreement between the organization and the Egyptian government (UNHCR, 2011). Current FAO projects in Egypt include an assessment of the risks from a sea level rise for groundwater and agriculture in the Nile Delta, the establishment of a monitoring system of the implementation of the sustainable agriculture strategy in 2030, or address income generation activities in rural areas, such as breeding goats or rabbits, for women and youths.

5. Moroccan Context

International migration by Moroccans has traditionally been and remains primarily directed towards Western Europe. It is estimated that two million Moroccans, 85 percent of all emigrants, are currently living in Europe. During the 1960s and 1970s, emigrants were mainly guest workers; from the 1970s to the 1990s, family reunification was the main form of migration. Since then, the share of illegal emigration in migration flows has been on the rise, partly driven by increasing activities in the agricultural and construction sectors in Southern Europe (EACH-FOR, 2008). The majority of emigrants are unskilled; but in 2000, nearly 20 percent of tertiary-educated individuals were living abroad (Gubert and Nordman, 2009; World Bank, 2011). For decades the Moroccan government encouraged emigration for economic and political reasons. More recently, the government has started cooperating with the European Union on the prevention of illegal migration of Moroccans and sub-Saharan Africans, for whom Morocco is an important transit country on their way to Europe. For instance, Morocco participates in joint navy patrols, and takes in both Moroccans and other nationals who are apprehended by border forces. In return, the country receives development assistance. It is estimated that there are 10-20,000 illegal immigrants in Morocco (IOM, undated).

Internal migration flows are larger than international flows. These movements are predominately rural to urban, which explains why cities have been growing at more than four times the rate as rural areas over the 2000 to 2010 period. During that time, the urbanization rate increased from 53 to 56 percent. However, as rural areas and small and medium-sized towns have become more developed partly due to remittances from international migrants, they have become more attractive as destinations in their own right (GCIM, 2005).

Morocco's inhabitants are already experiencing deteriorating environmental conditions and shocks that may put their livelihoods at risk, and it is expected that climate change will exacerbate this trend. Shifts include a decrease in precipitation, increasing risks of droughts, more dry areas towards the North of the country, and less ground water. Despite a low per-capita water usage of 500 m^3, Morocco is experiencing water stress. These water shortages are predominantly caused by climatic factors in the south and the pressure of population growth in the northern parts of the country (EACH-FOR, 2008). More than 80 percent of water is used in agriculture, even though only 13 percent of cropped land is irrigated. The Moroccan government estimates that at least until 2020, subject to sufficient investments in infrastructure, water needs will be met (Kingdom of Morocco, 2001). However, the EACH-FOR study (2008) suggests that by 2025, per capita available water resources will have decreased by 30 percent. Under different climate scenarios developed by a consortium of international (World Bank, Food and Agriculture Organization) and national organizations (such as INRA), it is expected that agricultural output will not be drastically affected by climate change until 2030. Subsequently, however, there may

be a strong decrease in agricultural output particularly in the northern and center-west parts of the country, where rainwater-based agriculture is currently predominant. The study also points out that the country faces uncertain declines in revenues from irrigation-based agriculture.

In a country where 40 percent of the population is employed in agriculture, and where nearly 70 percent of the poor live in rural areas (World Bank and Agence Française de Développement, undated), environmental shocks and resultant decreases in agricultural output are likely to negatively affect the livelihood of many individuals, and this creates the potential for migration movements. In addition, Morocco has 3,500 km of coastline, so that an increasing number of floods and as well as a rising sea level may also induce future migration movements.

While as for the other countries, there is currently no study that we know of that systematically evaluates how past environment changes influenced migration movements in Morocco, or how it might be expected to do so in the future, a recent report prepared for the U.S. National Intelligence Council (CENTRA Technology and Scitor Corporation, 2009) suggests that *"climatic stress will add to the already substantial movement of population from rural areas into cities"* in Northern Africa, and speculates that the cyclical movements in agricultural output that have been accompanied by cyclical movements of population between rural and urban areas in Morocco in the past might be replicated in the future. Another study points out that following a severe drought in 2007, two thirds of the illegal migrants arrested in Spain were from the farming and mining region of Khouribga (EACH-FOR, 2008). This suggests a link between environmental shocks and migration exists, and that at least some of the induced migration will be international. A case study by Hamza, El Faskaoui and Fermin (2009) based on a survey of 30 households in two oasis villages in the Middle Draa Valley of Southern Morocco found that environmental degradation was a major factor for either past or intended migration, with lack of access to services and opportunities also being major contributing factors.

In terms of policy framework, Morocco ratified the UNFCCC in 1995 and the Kyoto protocol in 2002. As for the other countries, as non-Annex I party country, Morocco is required to submit national communications. Morocco also ratified the United Nations Convention to Combat Desertification in 1996 and it submitted a National Action Plan in 2002. Under the National Action Plan against Climate Change adopted in 2009 plan, the Ministry for Agriculture is responsible for projects including the development of wheat varieties resistant to drought periods and parasites, the creation of systems of irrigation supplemental to present rain-fed cultures and an evaluation the expected impact of climate change on the fish population (Kingdom of Morocco, 2009). In addition, the second pillar of the 2008 'Plan Marco Vert' (Moroccan Green plan) is specifically aimed at reducing poverty. The more than 300 projects outlined in the plan are expected to target 500,000 to 600,000 farmers, representing 40 percent of all Moroccan farmers, and to cost 15 to 16 million dirhams (US$ 2 million). The aim is to allow farmers to switch to crops that are less sensitive to variations in rainfall, such as olive and almond trees and cacti, to diversify their crop, and to improve agricultural techniques (Ministry of Agriculture and Fishery, 2008; Aujourd'hui, 2008).

The High Commission for Water, Forests and the Fight against Desertification is responsible for the National Action Plan for the fight against Desertification adopted in 2001. Implementation by 2020 is to include the development of an early warning system against droughts. The Water Department of the State Secretary for Water and Environment is planning a variety of adaptive measures for the 2010 to 2030 period, including building protective structures against floods, developing a plan as well as hydraulic basins for drought periods, educating the public and farmers against water wastage, changing the water pricing system for irrigated

agriculture, etc. The population living at sites with extremely high flood risk is to be relocated, with the Ministry for Housing, Urbanism and Regional Planning charged with such relocations (Kingdom of Morocco, 2009). The Department of Environment, following the ratification of the UNFCCC and of the Kyoto protocol, has set up a number of administrative units and committees that are concerned primarily with developing mitigating rather than adaptive strategies. In addition, the Department of the Environment decided in 2011 to prepare a national strategy on climate change with a national plan including a large number of new activities in this area, especially for water management.

Examples of support provided by donors include four projects financed by Canada's IDRC and the United Kingdom's DFID. The projects aim to increase the adaptive capabilities to climate changes of two villages in plane and mountainous regions, address water scarcity and water management in the Saiss Bassin in Northern Morocco, hold workshops for community-based adaptation to desertification and reduction of water resources, and prepare coastal communities to be able to adapt to phenomenon linked to climate change. They are carried out with non-governmental national partners including INRA (National Institute for Agricultural Research), ENFI (National School for Forestry Engineers), the University Al Akhawayn, and RIOD Maroc, a Moroccan network of non-governmental and community-based organizations.

As an example, the project in the coastal areas combined efforts to collect rainwater and to develop new farming and soil preservation techniques in conjunction with the villagers with training efforts for women, such as literacy classes, since women cannot move as easily in response to environmental shocks as men (EMWIS, 2010). The IOM has an office in Morocco since 2007, and is principally concerned with voluntary return projects for irregular migrants in the country. An example of a currently ongoing UNDP program is a program intended to increase the adaptability of oases to climate change. It aims to strengthen local long-term planning mechanisms and explore financing options for adaptive measures. The World Bank is currently financing a project on Integrating Climate Change into the Plan Marco Vert. It aims to strengthen the capacity of public and private institutions to integrate climate change adaptations into projects aimed at small farmers in five target regions (World Bank, 2011).

6. Syrian Context

International out-migration is high in Syria, although estimates of its extent vary. According to Kawakibi (2009), 18 percent of Syrians have migrated abroad, and a study by the Syrian Commission for Family Affairs estimated that in 2007, 3.4 million people (15 percent of the total population) lived abroad (Marzouk, 2010). But another report by the United Nations stated that in 2005, less than 750,000 Syrians were living abroad (Marzouk, 2010). Still, it appears that throughout the 2000s, emigration has increased. While the majority of emigrants during the 1960s and 1970s moved to the Persian Gulf, circular migration with Lebanon, Jordan, and the Gulf states became more common in recent decades. There is also some evidence of brain drain: while only 0.9 percent of Syrians live in OECD countries, the emigration rate of individuals with tertiary education to these countries in 2000 was 3.7 percent (Dumont, 2006).

Syria is also a receiving country for migrants and especially refugees, including Iraqis since 2003 and Lebanese in 2006 (Kawakibi, 2009). As a result, while in 2000 5.6 percent of the population was made of immigrants, this had increased to 10.2 percent by 2010 (World Bank, 2011). In addition, Khawaja (2002) found that 14 percent of the Syrian population migrated internally from one administrative unit to another at some point during their life, and that around 5 percent migrated during the previous five years. The most common moves are from rural to

urban areas, which in 2010 were home to 55 percent of the population, up from 52 percent in 2010 (World Bank, 2010). Khawaja sees this as a lower than expected internal migration rate, and suggests that the main reasons for this are the high percentage of people who own their apartment or houses, and the relative equal distribution of access to social services and even wages throughout the country. Surveys indicate that moves for family reasons are more common than those for work-related motives, but internal migration may have recently increased.

Syria is an arid to semi-arid country. A third (32 percent) of the land is cultivated, of which 75 percent is rainfed and 45 percent is pastures. Since the 1980s, the country has been able to meet its own food needs and even export food. However, today the country is witnessing a deteriorating environment and a more adverse climate. Between 1980 and 2006, 13 percent of agricultural land was downgraded because of human activity. Rainfall decreased by 10mm per year (with an annual average of 300mm per year) from 1956 to 2006 (El-Atrache, 2009), with large regional variation. For example, the northern and northeastern parts of the country have experienced decreasing precipitation in winter, while the northern and central regions have experienced more rain in autumn (Ministry of State for Environmental Affairs [MSEA], 2010). Summer temperatures have risen significantly, particularly in the coastal zones (Qabbani, 2010; MSEA, 2010). From 2006 to 2009, Syria experienced a severe drought (Sowers and Weinthal, 2010), and droughts may become more common in the future (MSEA, 2010). Rises in the sea level will be another potential consequence of climate change, with an estimated 3.8 percent of the coastal population potentially being affected. Among those affected, 2-6,000 farming families may lose their livelihoods and homes (MSEA, 2010).

Syria uses 18 billion m^3 of water per year, in excess of the estimated 15 billion m^3 of renewable resources. The agricultural sector is responsible for 90 percent of water usage. With an available 1,000 m^3 of water per capita and year, Syria is on the threshold of water poverty (MSEA, 2010). Population growth, decreases in precipitation, pollution, and increased demand due to development are likely to decrease consumption, possibly to 500 cubic meters per person per year in 2025. Syria's first National Communication to the United Nations Framework Convention on Climate Change reports that between 2010 and 2100, annual precipitation could decrease between 34 to 75mm, and temperatures could rise by 2.8 to 7 percent (Qabbani, 2010). Based on the CROPWAT irrigation management model of the FAO, it was estimated that under these scenarios, irrigated wheat agriculture in the Hassakeh governorate could experience a reduction in yield of 16 percent by the end of the century, while yields from non-irrigated land could drop by more than 20 percent if no additional irrigation be provided (MSEA, 2010).

To the best of our knowledge there are very few systematic studies on how past environmental changes have impacted migration in Syria. Khawaja (2002) did explicitly ask whether environmental problems were related to the decision to move, but the low incidence of individuals naming work or income as reasons for migration may suggest that at least in the late 1990s and early 2000s, climate factors were not a prime motive for migration. However, in a country where 45 percent of the rural population work in agriculture, and 75 percent of the cultivated land is not irrigated, as temperatures rise and precipitation falls, this may change in the future, especially in periods of droughts (Qabbani, 2010).

Past experience suggests that migratory movements in response to large-scale environmental shocks may be substantial. For instance, a study by the Canadian International Institute for Sustainable Development suggests that 160 villages in the north-east of the country were entirely abandoned during the 2007/2008 period of the current drought that has lasted since 2006 (El-Atrache, 2009; Sowers and Weinthal, 2010). An assessment mission of the Syrian

government and the UN estimated that the drought has affected 1.3 million inhabitants of Eastern Syria. More than 800,000 persons lost their entire livelihood, with small-scale farmers and herders being particularly affected. Many initially tried to react to the drought by selling livestock below prices, reducing food intake, and selling assets (Alqusairi, undated), but eventually, an estimated 40,000 to 60,000 households migrated in response to the drought (DREF, 2009). Among these, 200,000 to 300,000 people were from the Al-Hasakeh governorate, representing 13-20 percent of the total previous population and 41-62 percent of the affected population (DREF, 2009). Such massive moves put pressure on urban infrastructure, reduce economic growth, and lead to worsening educational and health outcomes among migrants. Unusually, migration was predominantly by entire families, rather than just men.

In terms of policy framework, Syria ratified the UNFCCC in 1996 and signed the Kyoto Protocol in 2005. As the other four countries, it is required to submit national communications. The country ratified the International Convention to Combat Desertification in 1997, and it fulfilled its obligation to submit a National Action Plan in 2002. The Ministry of State for Environmental Affairs (MSEA) was established as the first one in the Arab World. It is primarily engaged in the research into and establishment of mitigation strategies, and is less focused on adaptation (Eido, 2006). It is also responsible for applying environmental law (MSEA, 2010). The Council for the Protection of the Environment is an inter-ministerial body tasked to set policy and coordinate environmental activities between different ministries (MSEA, 2010).

Syria has not yet developed and implemented wide-ranging adaptation policies with regards to climate change. The objectives of the Syrian Agricultural Strategy for 2001-2010 did not define sustainability, or adaptation to climate change, as a policy objective (NAPC, 2006). The focus was on increasing producers' income, introducing modern technologies and increasing the contribution of the agricultural sector to the country's GDP. The mid-term assessment of the strategy showed increased agricultural productivity; but it appears that aspects of the policy that would lead to a more sustainable agriculture, such as switching to more suitable crops and making the use of modern irrigation techniques more widespread were still facing difficulties. Nevertheless, in its first National Communication to the UNFCCC, a number of possible future adaptation measures are discussed. These include preparing a national water master plan, enforcing water-related laws and regulations, improving irrigation efficiency and rain collection techniques, rationalizing water use, rehabilitating dams, reviewing agricultural policy under the changed conditions of climate change, further pursuing agricultural research, developing suitable land use policies, and modernizing farm management and farming technology (MSEA, 2010). And in response to the most recent drought, the Syrian government and the UN Country Team developed a Drought Response Plan. The government handed out emergency aid, veterinary services, vaccinations and food assistance (Alqusairi, undated; FAO, 2009).

In areas with 250-350 mm of rainfall per year, as well as in hilly and mountainous areas, the government has implemented a number of policies and projects aimed at improving living conditions, for instance through improving road infrastructure, increasing agricultural productivity, land reclamation, and giving women access to income-generating activities. From 2002 to 2007, the government also implemented a project of unemployment alleviation loans that provided loans to small, intermediate and large enterprises, as well as household and small project grants. The project was extended and further institutionalized in 2006 (National Agricultural Policy Center [NAPC], 2008). A preliminary evaluation of these policies based on a pilot study concluded that improvements in rural infrastructure and agricultural employment

opportunities may have led to increased migration to rural areas, though these are not by any means large enough to offset the large rural-to-urban migration flows (NAPC, 2008).

Support by donors for coping with and adaptation to climate change may also be less extensive in Syria than ion the four other countries of focus of this study. Examples of such support include the delivery by the Syrian Arab Red Crescent of food parcels to 8,000 families during the recent drought (DREF, 2009), and assistance provided by the IOM for the re-settlement of foreign refugees and migration management. The United Nations High Commissioner for refugees also provides various services to Iraqi refugees in Syria.

7. Yemeni Context

Yemenis have been migrating out of the country to oil-producing Arab Gulf States, North America, and Europe for several decades. The current stock of Yemeni emigrants is estimated at 1,134,700, or 4.7 percent of the population. Migrants constitute six percent of the tertiary-educated population. The main destination countries for migrants remain Saudi Arabia, the UAE, and the United States (Ratha, Mohapatra and Silwal, 2010). Yemen is also a country of passage for migrants from Sub-Saharan Africa (Fargues and Bensaad, 2007) and a destination for an increasing number of refugees (UNHCR, 2011). Some 60 percent of immigrants are Somali, 30 percent Ethiopian, and 10 percent Eritrean and from other nationalities (Al-Ariqi, 2010). Currently, immigrations constitute 2.1 percent of the population.

Internal migration is primarily directed towards urban areas, which constitute an increasing share of total population and are experiencing faster population growth than rural areas. In 2010, urban areas constituted 31 percent of the total population, up from 26 percent in 2000 (World Bank, 2011). Although urban population growth rates have fallen slightly between 2000 and 2010 from 4.9 percent per year to 4.7 percent per year, urban population growth is more than twice that of the rural population, at 2.0 percent per year. In addition to voluntary migration, 350,000 individuals have been displaced since 2004 by a violent conflict between insurgents and the government in Northern Yemen (IOM, 2010).

Although weather data for Yemen may be less accurate than for other countries, making it more difficult to construct future climate change scenarios (Al-Tholaya, 2010), annual mean temperature appears to have increased by 1.8 degrees Celsius since 1960. Temperatures are expected to increase by 1.2 to 3.3 degrees Celsius by 2060 and 1.6 to 5.4 by 2090. Monthly rainfall has fallen by 1.2 mm since 1960, a decrease of nine percent. In the future, sea-level rises may also threaten the coastal cities, in particular Aden (Al-Tholaya, 2010).

Predictions about future rainfall trends vary by climatological model, with some models predicting increased rainfall while others predict decreased rainfall (McSweeney, New, and Lizcano, 2009). Decreased rainfall has the potential to harm rainfed agriculture, which constitutes an important fraction of Yemen's cereal production (FAOUN, 2009). Even without decreases in rainfall, water scarcity will be a challenge due to limited water resources, population growth, and the water use for the production of khat. In 1955, per capita water availability was 1,098 cubic meters, but by 1990 it had fallen to 460 cubic meters per capita (Republic of Yemen, 2008). Moreover, projections suggest that under business-as-usual scenarios per capita water availability will fall further to 150 cubic feet (Republic of Yemen, 2008).

A study by McKinsey suggests that water shortages could lead to the loss of 750,000 jobs and a decrease in income of 25 percent (Rudolf, 2010). In the capital Sana'a in particular, water is currently being extracted at four times the replenishment rate. According to reports based on a World Bank-funded assessment of the Sana'a basin, the capital city's water resources are being

depleted by a fast-growing population (IRIN 2010b), and the expanding urban population is due in part to migration from rural to urban areas (Boucek 2009). Projections suggest Sana'a may deplete is economically-viable water supplies—primarily groundwater— in a decade (IRIN 2010b; see also Rudolf, 2010; Sowers and Weinthal, 2010). Extreme weather events are also becoming more common. For instance, Wynter (2009) reports that flash floods are becoming increasingly more common, endangering the life of villagers that live close by.

There is little systematic research into how past environmental change has impacted migration in Yemen, but Yemen's population is quite vulnerable to climate shocks. While agriculture generates only 15 percent of GDP, it employs more than 55 percent of the active population. Decreases in agricultural yields are expected in the future, which would impact livelihoods. Some 84 percent of the rural poor are dependent on rainfed subsistence agriculture, a form of agriculture that is highly vulnerable to the impact of climate change (World Bank, 2010). Environmental changes affecting the agricultural sector could increase rural to urban migration.

Yemen became party to the UNFCCC in 1992, and signed the Kyoto protocol in 2004. As a non-Annex I party country, it is required to submit national communications. Yemen is also party to the UN Convention to Combat Desertification. In 2008, the government adopted a plan by the Ministry of Water and Environment to increase available water resources. The plan calls for assessing climate change impacts on water resources and improving climate monitoring. The plan first targeted Sana'a, calling for the city to gather and harvest 70 percent of its rainwater in by 2012. By 2020, the plan calls for 40 percent rainwater to be harvested in the rest of the country (Sorel, 2010). However, there has been little visible progress toward these goals (IRIN, 2010a). In 2009, the Environmental Protection Authority outlined 22 adaptation projects that were identified as the most urgent through a participatory process with multiple local and national stakeholders. The proposed projects include rainwater harvesting, disaster preparedness to extreme weather events, desalinization of sea water, promotion of modern irrigation technologies, improved crop management, establish a national research center on climate change and adaptation issues, develop and implement sustainable land management strategies, and construct coastal defenses. Financing would come from donors and implementing agencies would include the Environmental Protection Authority (EPA), the Ministry of Agriculture and Irrigation, the Ministry of Water and Environment, the Civil Aviation and Meteorological Authority, and the Marine Science and Biological Research Authority. With Yemen being a pilot country under the World Bank's Pilot Program for Climate Resilience with the Minister of Water and Environment and the EPA as the main contact points, US$ 1.5 million are available for adaptation projects (Climate Facts Update, 2010).

Examples of projects being supported by donors include a US$13.5 million grant by the US government through the World Food Program to support humanitarian efforts (Sorel, 2010). IOM activities in Yemen include technical cooperation and training (funded by the European Union) on migration and border management, hosting conferences on labor migration with GCC countries as well as Somalia and Ethiopia, assisting government agencies with the fight against human trafficking, and providing emergency assistance to families displaced by the 2008 flooding in Hadramout and by conflict in northern Yemen (Al-Ariqi, 2010). Among other activities, UNDP assists Yemen with preparing its second National Communication to UNFCCC, provides capacity and institutional building, strategic planning and basin level water governance and management to manage Yemen's water resources, and provides technical assistance to help local authorities manage the recovery process after the 2008 flooding. The UNHCR provides assistance both to international displaced refugees, as well as to in particular

Somali refugees. Among other activities, the FAO provides poor smallholder farmers with improved drought-resistance seeds, as well as fertilizers (FAO, 2009).

8. Conclusion

The objective of this chapter was to explain the rationale for the choice of the focus countries in this study, and provide contextual background on each of the five countries. The focus countries were chosen because they tended to have large populations, be vulnerable to extreme weather events and especially droughts, represented various settings in terms of socio-economic conditions, and provided access to other available data sources in some cases, on top of the data being collected specifically for the study. As to the contextual background about the countries, information was provided on traditional patterns of international and domestic migration as well as on the challenges faced by the various countries regarding climate change, and the ways the countries have organized themselves institutionally to respond to those challenges. While the countries are diverse, they do appear to face many common challenges.

References

Adaptation Learning Mechanism (ALM), *MENARID - Adaptation to Climate Change Using Agriobiodiversity Resources in the Rainfed Highlands of Yemen*, 2009. As of September 22, 2011.

Agoumi, A., *Vulnerability of North African Countries to Climatic Changes – Adaptation and Implementation Strategies for Climate Change*, Winnipeg, Canada: International Institute for Sustainable Development, 2003.

Agrawala, S., A. Moehner, M. El Raey, D. Conway, M. van Aalst, M. Hagenstad, and J. Smith, *Development and Climate Change in Egypt: Focus on Coastal Resources and the Nile*, Paris: Organisation for Economic Co-operation and Development (OECD), 2004.

Ait Hamza, M., B. El Faskaoui, and A. Fermin, "Migration and Environmental Change in Morocco: The Case of Rural Oasis Villages in the Middle Draa Valley," EACH-FOR Case Study Report, 2009.

Al-Ariqi, Y., "Fawzi Al-Zioud, office in charge of the IOM in Yemen, to the Yemen Times: 'IOM, through its cooperation with the EU, strives at empowering the government of Yemen and Civil Society to address many of the unique migration challenges Yemen faces today,'" *Yemen Times*, October 21, 2010. As of September 22, 2011.

Alqusairi, D., *Risk Profile and Emergency Management of Syria*, undated.

Al-Tholaya, A., "Climate Change in Yemen: Drastic changes in the coming 50 years," *Yemen Times*, May 3, 2010. As of September 22, 2011.

Aujourd'hui, *Plan Maroc Vert: L'agriculture marocaine à la croisée des chemins* [Moroccan Green Plan: The Moroccan agriculture at the crossroads], April 25, 2008.

Boucek, C., "Yemen: Avoiding a Downward Spiral, Carnegie Papers: Middle East Program," Number 102, Washington, DC: Carnegie Endowment for International Peace, September 2009. As of September 22, 2011.

Brown, O., and A. Crawford, *Changements Climatiques et sécurité en Afrique – Une étude réalisée pour le Forum des ministres des Affaires étrangères d'Afrique du Nord en 2009*, Winnipeg, Canada: International Institute for Sustainable Development, March 2009.

CENTRA Technology, Inc., and Scitor Corporation, "North Africa: The Impact of Climate Change to 2030. Geopolitical Implications," conference report prepared for the National Intelligence Council, 2009.

Central Intelligence Agency (CIA), *The World Factbook – Algeria,* August 2011.

Climate Funds Update, *Pilot Program for Climate Resilience*, 2010.

Cline, W. R., *Global Warming and Agriculture: Impact Estimates by Country,* Washington, DC: Center for Global Development/Peterson Institute for International Economics, July 2007.

de Haas, H., *North African Migration Systems: Evolution, Transformations and Development Linkages,* Oxford, United Kingdom: University of Oxford International Migration Institute, 2007.

de Regt, M., *Migration To and Through Yemen: The Case of Migrant Domestic Workers*, discussion, Egypt: American University Cario, 2007. .

Di Bartolomeo, A., T. Jaulin, and D. Perrin, *CARIM Migration Profile -Algeria: The Demographic-Economic Framework of Migration,* Florence, Italy: European University Institute, December 2010.

DREF Operation, "Syria: Drought," International Federation of Red Cross and Red Crescent Societies, August 3, 2009.

Dumont, J.-C., "Immigrants from Arab Countries to the OECD: From the Past to the Future," *United Nations Expert Group Meeting on International Migration and Development in the Arab Region,* Beirut, Lebanon: United Nations Secretariat Population Division, May 15-17, 2006.

EACH-FOR, *General Overview Study – Middle East and Northern Africa,* Bonn, Germany: United Nations University, 2008.

EACH-FOR. 2009a. Egypt Case Study Report. January 30, 2009.

EACH-FOR. 2009b. D.2.5.1. General Overview Study – Middle East and North Africa.

EACH-FOR. 2009c. Egypt Case Study Report. January 30, 2009.

EACH-FOR, *D.2.5.1. General Overview Study – Middle East and Northern Africa*, February 14, 2008.

Economic and Social Commission for Western Asia and League of Arab States (ESCWA and LAS), *Arab Region State of Implementation on Climate Change (Draft).*

Egyptian Environmental Affairs Agency (EEAA), *Egypt Second National Communication under the United Nations Framework Convention on Climate Change*, May 2010.

Eido, M., *Stakeholder Analysis Climate Change in Syria*, Damascus: Ministry for Local Administration and Environment, July 2006.

El-Atrache, T., "Syria: 160 Villages Deserted 'Due to Climate Change'," *Arab Environment Watch*, June 2, 2009

EuropeAid, "Working Together: Fighting Illegal Immigration," *ENPI Special*, No. 6, September 2008.

European Commission, *Labour Markets Performance and Migration Flows in Arab Meditterranean Countries: Determinants and Effects. Volume 2. National Background Papers Maghreb.* Brussels, Belgium: European Commission Directorate-General for Economic and Financial Affairs, occasional paper 60, April 2010.

Euro-Mediterranean Information System on know-how in the water sector (EMWIS), *Morocco: Helping Village Women to Adapt to Climate Change,* August 18, 2010.

European Union, *EU-Egypt Action Plan*, 2007.

Fargues, P., *Emerging Demographic Patterns across the Mediterranean and their Implications for Migration through 2030.* Washington, DC: Migration Policy Institute, 2008.
Fargues, Philippe, and Ali Bensaad, *Senders Turned Into Receivers: Transit Migration in the Middle East and North Africa*, Florence, Italy: European University Institute, 2007.
Food and Agriculture Organization [FAO], *Syria Drought Response Plan 2009*, August 11, 2009.
Food and Agriculture Organization of the United Nations, *Algeria Country Brief*, undated.
Food and Agriculture Organization (FAO), *FAO Technical Cooperation Department Field Programme Activities – Egypt*.
Food and Agriculture Organization of the United Nations (FAOUN), "FAO/WFP Crop and Food Security Assessment Mission to Yemen," *Food and Agriculture Organization*, December 9, 2009.
Global Commission on International Migration (GCIM), "Morocco's Migration Transition: Trends, Determinants and Future Scenarios," *Global Migration Perspectives*, No. 28, April 2005.
Gubert, F., and C. J. Nordman, "Migration Trends in North Africa: Focus on Morocco, Tunisia and Algeria," *OECD Journal: General Papers*, Vol. 2009, No. 15, 2009, pp. 75-108.
International Development Research Centre (IDRS), *Projects in Algeria: Evaluation of Environment and Natural Resources Management Capacity Building Efforts in Algeria,* undated.
Institut Royal des Etudes Stratégiques [Royal Institute for Strategic Studies], *Présentation: Changements Climatiques.*
International Organization for Migration, *IOM Activities – Algeria,* undated. As of September 22,
International Organization for Migration (IOM), *Morocco*, 2010.
International Organization for Migration, *Country Profiles: Syria.*
International Organization for Migration (IOM) Cairo, *Migration and Development in Egypt*, 2010.
International Organization for Migration (IOM), *Africa & Middle East: IOM expands aid efforts to reach more conflict-affected displaced people and host communities*, press briefing, October 12, 2010.
IRIN, *Yemen: Capital City Faces 2017 Water Crunch*, March 23, 2010b.
IRIN, *Yemen: Failing to Harvest the Rain*, August 10, 2010a.
Kawakibi, S., *La Gestion de la Migration en Syrie: Une perspective globale*, Florence, Italy: European University Institute, 2009.
Khawaja, M., *Internal migration in Syria: Findings from a national survey*, Oslo, Norway: FAFO, report 375, 2002.
Kingdom of Morocco, Ministry for Regional Planning, Urbanism, Housing and the Environment, *Communication Nationale Initiale à la Convention Cadre des Nations Unies sur les changements climatiques* [First National Communication for the United Nations Framework Convention on Climate Change], 2001.
Kingdom of Morocco, *Plan national de lutte contre le réchauffement climatique* [National Action Plan Against Climate Change], November 2009.
Libération, "Abdellatif Khattabi, coordinateur du project Adaptation au changement climatique au Maroc – ' La Vision 2010 n'a pas pris comptes des risques écologique'" [Abdellatif Khattabi, coordinator of the project 'Adaptation to Climate Change in Morocco' – 'The 2010 Vision did not take ecological risks into account'"], April 18, 2010.

Libération, "Depuis une quarantaine d'années, le Maroc est soumis à des conditions difficiles – Programme d'adaptation aux changements climatiques" [Morocco has been Subject to Difficult Conditions for the Past Forty Years – Adaptation Programme to Climate Change], May 20, 2009.

Marzouk, N., *L'émigration syrienne hautement qualifiée: les enjeux sociopolitiques,* Florence, Italy: European University Institute, 2010.

McSweeney, C., M. New, and G. Lizcano, *Yemen:* Republic of Yemen, *Acceptance of Offer to Participate in the Pilot Program for Climate Resilience*, 2009.

Ministère de l`Aménagement du Territoire, et de l`Environnement (Ministry for Territorial Management and Environment; MATE), *Elaboration de la stratégie et du plan d'action national des changements climatiques. Communication nationale initiale*, 30 April 2001.

Ministère de l`Aménagement du Territoire, et de l`Environnement (Ministry for Territorial Management and Environment; MATE), *Seconde communication nationale de l'Algérie sur les changements climatiques à la CCNUCC*, 25 November, 2010.

Ministry of Agriculture and Fishery, *Plan Maroc Vert. Présentation générale* [Moroccan Green Plan General Presentation], 2008.

Ministry of State for Environmental Affairs, *Initial National Communication of the Syrian Arab Republic – Submitted to the United Nations Framework Convention on Climate Change*, April 2010.

National Agricultural Policy Center, *Mid-term review of the Syrian Agricultural Strategy*, Damascus, Syria: Ministry of Agriculture and Agricultural Reform, October 2006.

_____, *Non-agricultural Activities in Rural Areas and Their Impacts on Agriculture in Selected Aareas of Syria,* Damascus, Syria: Ministry of Agriculture and Agricultural Reform: June 2008.

National Intelligence Council. *North Africa: The Impact of Climate Change to 2030 – Geopolitical Implications.* Conference Report prepared by CENTRA Technology, Inc., and Scitor Corporation, December 2009.

Qabbani, A., "State of Denial," *Syria Today*, November 2010.

Republic of Yemen, *National Adaptation Programme of Action*, 2008.

Ratha, D., S. Mohapatra, and A. Silwal, *Migration and Remittances Factbook 2010. .*

Rudolf, J. C., "In Yemen, water grows scarcer," *New York Times Green – A blog about Energy and the Environment,* October 25, 2010.

Sekkai, R., "Migrants target booming Algeria," *BBC Focus on Africa Magazine,* January 2, 2008.

Shalaby, T., *The impact of climate change on migration: The Case of Egypt,* presentation at the First Workshop on Climate-Induced Migration and Displacement in MENA, June 15-16, 2010.

Shidiwah, M., *Phase I Proposal for Yemen's Pilot Program for Climate Resilience*.

Sorel, M. A., "Climate Change Exacerbates Yemen's Water Woes," *Foreign Policy Digest*, September 1, 2010.

Sowers, J., and E. Weinthal, *Climate Change Adaptation in the Middle East and North Africa: Challenges and Opportunities*, The Dubai Initiative Working Paper No. 2, September 2010.

Swain, A., "Water Wars: Fact or Fiction?" *Futures*, Vol. 33, 2001, pp. 769–781.

Temlali, Y., *Algeria, Land of E(Im)migration*, 2010.

UNDP Climate Change Profile, documentation, 2009.

United Nations Development Programme, *Adaptation aux Changements Climatiques au Maroc pour les Oasis Resilientes*. World Bank and AFD, *Managing social dimensions of climate change in MENA: Climate change and human mobility Concept Note*.
United Nations Development Programme, *UNDP Yemen*.
United Nations Development Programme, *Approche territoriale des changements climatiques' entre le PNUD et le Ministère de l'Aménagement du Territoire, de l'Environnement et du Tourisme*, undated.
United Nations Development Programme (UNDP), *L'éducation environnementale dans le système scolaire,* undated.
United Nations Environment Programme (UNEP), *Briefing Notes on Algeria,* undated.
United Nations Industrial Development Organization (UNIDO), *Brief Description of UNIDO Project DG/ALG/94/006, NU/ALG/94/006,* undated.
United Nations Convention to Combat Desertification (UNCCD*), Country Information Database: Egypt.*
United Nations Development Programme (UNDP), *MDG Achievement Fund JP – Climate Change Risk Management in Egypt*.
United Nations High Commissioner for Refugees (UNHCR), *2011 UNHCR country operations profile – Egypt*, 2011
United Nations High Commissioner for Refugees (UNHCR), *Clashes in Southern Yemen Spark New Displacement*.
United Nations High Commissioner for Refugees, *2011 UNHCR Country Operations Profile – Syrian Arab Republic*.
Warner, Koko, Tamer Afifi, Olivia Dun, Marc Stal, and Sophia Schmidl, *Human Security, Climate Change, and Environmentally Induced Migration*, United Nations University Institute for Environment and Human Security Report, June 30, 2008.
World Bank, *Integrating Climate Change in the Implementation of the Plan Maroc Vert,* May 3, 2011.
World Bank, *World Development Indictors* (Edition: 2011).
World Bank, *Comprehensive Development Review, Yemen: Building Block on Urbanization*, 2000.
World Bank, *World Bank Loan to fight Poverty in Rural Algeria with Job Creation*, Press Release No. 2003/314/MNA, Washington, D.C.: World Bank, April 23, 2003.
World Bank, *Project Appraisal Document on a Proposed Grant from the Global Environment Facility Trust Fund in the Amount of US$4.0 Million to the Republic of Yemen for an agro-biodiversity and climate adaptation project,* May 5, 2010.
Wynter, A. "Yemen Red Crescent on Climate-change Front Line," *Red Cross Red Crescent – News*, June 18, 2009.
Zohry, A.*, Interrelationship between Internal and International Migration in Egypt: A Pilot Study, Development Research Centre on Migration*, Globalization and Poverty Research Report, Brighton: University of Sussex, July 2005.