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North Africa: The Impact of Climate Change to 2030:

Geopolitical Implications

This paper does not represent US Government views.

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Geopolitical Implications

Prepared jointly by

CENTRA Technology, Inc., and Scitor Corporation

The National Intelligence Council sponsors workshops and research with nongovernmental experts to gain knowledge and insight and to sharpen debate on critical issues. The views expressed in this report do not reflect official US Government positions.

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Scope Note

Following the publication in 2008 of the National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030 (NIA 2008-01, June 2008), the National Intelligence Council (NIC) embarked on a research effort to explore in greater detail the national security implications of climate change in six countries/regions of the world: India, China, Russia, North Africa, Mexico and the Caribbean, and Southeast Asia and the Pacific Island States. For each country/region we are adopting a three-phase approach.

- In the first phase, contracted research explores the latest scientific findings on the impact of climate change in the specific region/country. For North Africa, the Phase I effort was published as a NIC Special Report, ***North Africa: The Impact of Climate Change to 2030 (Selected Countries), A Commissioned Research Report*** (NIC 2009-05), of August 2009.
- In the second phase, a workshop or conference composed of experts from outside the Intelligence Community (IC) determines whether anticipated changes from the effects of climate change will force inter- and intra-state migrations, cause economic hardship, or result in increased social tensions or state instability within the country/region. This report is the result of the Phase II effort for North Africa.
- In the final phase, the NIC Long-Range Analysis Unit (LRAU) will lead an IC effort to identify and summarize for the policy community the anticipated impact of climate change on US national security.

In August 2009, a group of regional experts convened to explore the sociopolitical challenges, civil and key interest group responses, government responses, and regional and geopolitical implications of climate change on North Africa through 2030. The group of outside experts consisted of social scientists, economists, and political scientists. The group focused on Algeria, Egypt, Libya, Morocco, and Tunisia. Although the targeted time frame of the analysis was out to 2030, the perceptions of decision makers in 2030 will be colored by expectations about the relative severity of climate changes projected later in the century. The participants accordingly considered climate impacts beyond 2030 where appropriate.

This work is provided under the Global Climate Change Research Program contract with CIA's Office of the Chief Scientist.

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Executive Summary

The National Intelligence Council-sponsored workshop entitled, *The Implications of Global Climate Change in North Africa*, held on 20 August, 2009, brought together a panel of experts to consider the probable effects of climate change on North Africa from a social, political, and economic perspective. The workshop focused on Algeria, Egypt, Libya, Morocco, and Tunisia. ***The panelists concluded that systemic state failures attributable solely to climate change to 2030 are not likely. However, climatic stress coupled with socioeconomic crises and ineffective state responses could generate localized social or governmental collapses and humanitarian crises.*** The effects of climate change in North Africa will exacerbate the region's existing challenges of insufficient water and food resources, low economic growth, inadequate urban infrastructure, and weak sociopolitical systems.

- Climate change will reduce water availability and quality, creating the potential for severe water shortages in both cities and rural areas. By 2030, three-quarters of Egyptians will have inadequate access to fresh water.
- Droughts, flooding, salinization, and overall water scarcity will adversely affect agriculture, threatening food security and forcing farmers off their land.
- Climatic stress will add to the already substantial migration from rural areas into cities, exacerbating the region's urban challenges. Cities will face deteriorating living conditions, high unemployment, and frequent civil unrest.
- ***The region is likely to face civil conflicts over scarce resources such as water, arable land, food, or employment, which may be expressed in sectarian, ethnic, or anti-regime tensions.***

North Africa faces increased risks of interstate conflict with southern neighbors over the next 20 years owing to the impacts of climate change.

- Attempts by Sudan or other upstream states to expand their use of the Nile River in response to climatic stress would seriously threaten Egypt and could provoke armed conflict.
- North African states may be drawn into conflicts or climatic crises in the vulnerable Sahel region to the south. Conflicts involving nomadic populations could easily see migrants cross state borders.

Climate change will likely increase the already substantial emigration of North Africans to Europe. The region will serve as a route for transmigration of Sub-Saharan Africans fleeing severe climatic stress.

- North African states will seek to encourage emigration as a safety valve, relieving demographic, resource, and employment pressures.
- European and North African cooperation to prevent an influx of Sub-Saharan African migrants may result in European states turning a blind eye to North African human rights abuses as long as migration is kept under control.

North Africa's capacity to adapt to climate change is inhibited by underdeveloped and disempowered civil societies and the dominance of repressive but often ineffectual regimes.

- A few key decision-makers dominate state policymaking and economic activity in North Africa. Their main objective over the next two decades will be to bolster regime security and resilience against climate change-induced instability.
- North African regimes are based on coercion and corrupt patronage systems and are lacking in institutional capital, ingenuity, and flexibility. State institutions are often unable or unwilling to provide public services or respond effectively to crises.
- Longstanding state suppression of civil mobilization and a lack of social capital will significantly constrain the capacity of civil society to address climate change.
- ***Ineffective state responses and state suppression of civil society allow Islamist groups to fill the void. Climatic stress will create opportunities for both moderate and extremist Islamist groups to expand their influence in North Africa.***

Nevertheless, North African states and societies have repeatedly shown the capacity to withstand sustained challenges without overall systemic collapse.

- North African states have robust capacity to maintain social control in the face of challenges and destabilization. They are adept at controlling information, deflecting blame, and suppressing opposition.
- Despite widespread institutional deficiencies, North African states have demonstrated the capacity to marshal considerable national resources and tackle large-scale infrastructure projects.
- Climate change is one of the few cross-cutting issues having the potential to spur more serious efforts at regional cooperation.
- Among the North African states, Libya and Algeria are less economically vulnerable to challenges that arise from climate change because their economies are supported by exporting fossil fuels and are not dependant upon agriculture or tourism.

North African states will actively seek Western assistance in addressing climate change. While the four Maghreb states will turn primarily to Europe, Egypt will rely more on the United States.

- North African states will leverage the threat of unrestrained migration or regional collapse to secure increased Western aid.
- Europe has a strong interest in preventing spillover from climate change-induced instability in North Africa and will likely intervene to avert state failures or social collapses. North Africa will absorb an increasing proportion of Europe's attention and resources.

Contents

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Introduction and Background[1]

Climate model projections available for North Africa indicate a clear increase in temperature over the next 20 years that is expected to continue throughout the 21st century, probably at a rate higher than the estimated global average. Model simulations also suggest a drying trend in the region, particularly along the Mediterranean coast, driven by large decreases expected in summertime precipitation. Because coastal areas historically receive by far the largest amount of rainfall in North Africa, future decreases will likely have a significant and noticeable impact. Precipitation trends in the interior semiarid and arid regions of North Africa are more difficult to predict due to the very small amount of natural precipitation that characterizes these areas. Climate change will induce some variations in precipitation patterns, but the trend is not clear, as some models predict slight increases and others predict slight decreases in annual precipitation amounts.

The Regional Climate Change Index (RCCI)[2] identifies the Mediterranean as a very responsive region to climate change ("Hot-Spot"). Given the ecological and socioeconomic characteristics of the southern Mediterranean countries, the impact of climate change may be more marked than in other regions of the world. Still, most of the predicted impacts in the region are already occurring regardless of climate change (e.g., water stress and desertification). Climate change is expected to exacerbate these trends.

Based on global climate projections and given inherent uncertainties, the most significant impacts of climate change in North Africa (Morocco, Algeria, Tunisia, Libya, and Egypt) will likely include the following:

- ***Water Resources Stress.***[3] All countries of North Africa are presently experiencing water stress. Model simulations show a general decrease in rainfall across North Africa, with median decreases in average annual precipitation of 12 percent and 6 percent projected for the Mediterranean and Saharan regions, respectively. This general drying trend for North Africa is punctuated by seasonal variations in projected precipitation that differ by region. Predicted decreases in average annual rainfall, accompanied by projected increases in the population of the region, may impede access to water for millions of inhabitants. In addition, with decreasing water levels, other ecological effects such as salinity in coastal areas and deterioration of water quality may increase.

[1] This section is extracted from the Executive Summary of the Phase I report (see Scope Note): ***North Africa: The Impact of Climate Change to 2030 (Selected Countries), A Commissioned Research Report*** (NIC 2009-05, August 2009). Some of the judgments in this report (Phase II) may differ from those in the Phase I report.

[2] The RCCI is calculated for 26 land regions from projections of 20 global climate models using the Intergovernmental Panel on Climate Change (IPCC) emission scenarios.

[3] Water Stress, as used by the IPCC, refers to a per capita water availability of below 1,000 cubic meters per person per year; sometimes IPCC referenced sources also use a ratio of withdrawals to long-term average runoff of 0.4. The IPCC formally defines a country as water stressed when withdrawals exceed 20% of renewable water supply.

- ***Agriculture.*** Model results are inconsistent regarding future changes in crop yields and agricultural growing seasons in North Africa, and we do not know whether variations in temperature, precipitation, or atmospheric CO_2 will be the dominant factor. One modeling study suggests that future increases in atmospheric CO_2 concentrations will increase maize yields in Morocco, while other modeling studies suggest that future increases in air temperature will have a negative effect on growing seasons and crop yields in Egypt. Relatively heat-tolerant species, such as maize, are expected to suffer the smallest losses in yield and growing area, while heat-intolerant crops, such as wheat, are expected to suffer the largest losses. In addition, intensive irrigation practices in the region may result in further salinity, which may lead to desertification. Adaptation strategies, including modifications in sowing dates to match climate changes and development of heat-tolerant crop varieties, will likely mitigate some of the expected negative effects on North African agriculture. Development of regional and local climate models in the coming years that include projections of Mediterranean Sea level rise and decreases in the Nile River flow are expected to provide more accurate estimates of future changes in North African agricultural regions.
- ***Migration.*** In recent years, North Africa has experienced vast migration pressures from both migrants that settle in the region from the south or that use North African countries as a transit area to reach Europe. Thus far, experts have not cited climate change as a driving force for migration in the region; nevertheless, a warmer climate and changing precipitation patterns, which will likely reduce viable cropland and reduce access to water, will increase urbanization and make accommodating the needs of a growing population more difficult. Besides food and water necessities, climate change-related migration may also imply greater demands on infrastructure along the coasts as well as ethnic, racial, or religious clashes.
- ***Natural Disasters.*** Because of the lack of historical data from tide gauges in the region, the wide range of future estimates in sea level, and the paucity of regional climate model projections for the Mediterranean Sea, a definitive estimate of sea level rise along the coastline of North Africa in the next 20 years is not possible. However, the intensity and frequency of floods along the Mediterranean coast are expected to increase by the middle of the 21st century. Compared to other regions, the impacts of sea level rise in North Africa are expected to be stronger in terms of social, economic, and ecological factors. Highly populated and agriculturally important coastal cities are the most vulnerable.

In addition, two more potentially serious impacts are the following:

- ***Tourism.*** Tourism is an important source of income for most countries of North Africa. Of concern, however, are the large quantities of water this sector demands and the little attention that governments of this region have given to water provision in the past. Thus, increased water scarcity, sea level rise, and increasing temperatures will likely have a negative impact on this sector and consequently the economy of most North African countries.
- ***Energy.*** The economies of Algeria, Libya and (to a lesser extent) Egypt are dependent on the hydrocarbon industry. Because of the revenues they receive from

exporting fossil fuels—mostly to Europe—they are to some degree more resilient to the deleterious impacts of climate change. Any shift in the interest of other regions in importing natural gas and oil from North Africa, conversely, may make these North African countries considerably more vulnerable. However, there is no indication now that Europe and other importing regions will stop importing from North Africa in the next few decades.

Based on a comprehensive global comparative study of resilience to climate change (including adaptive capacity) using the Vulnerability-Resilience Indicators Model, a wide range of adaptive capacity is represented in this group of countries from Libya (ranking 34th in a 160-country study) to Morocco (ranking 136th in the same study). Under a high-growth scenario of the future, all countries gain adaptive capacity, especially Libya. However, under a delayed-growth scenario, all of these North African countries lose adaptive capacity.

Social, Political, and Economic Challenges

Even in the absence of global climate change, North Africa will face significant sociopolitical challenges over the next two decades. The region will have to contend with pressures created by a burgeoning youth population, tenuous economic growth, persistent unemployment, and urbanization and related stresses including inadequate housing and infrastructure. The effects of climate change in North Africa will likely exacerbate these existing political, economic, and social challenges, potentially worsening them to the point of plunging the region into crisis.

Hydrologic Challenges

North Africa is one of the world's most arid regions, and the lack of water represents one of the most important challenges facing North African states and societies. Water availability is the primary determinant of settlement patterns in the region, a fact illustrated most dramatically by Egypt's Nile Valley. Water stress and scarcity are major problems across the region due to major population growth and economic development as well as to arid conditions. As a result, significant segments of the population in North Africa depend on a limited number of tenuous water sources that are in danger of depletion even under current climatic conditions. The most extreme examples are the oasis settlements of the Sahara, where densely concentrated populations depend on a single source of groundwater. Such conditions render North Africa particularly vulnerable to climate change-induced hydrologic challenges.

The hydrologic impacts expected as a result of climate change to 2030 will differ across the region. North Africa comprises at least three distinct hydrologic systems. Egypt is almost entirely dependent on water from the Nile, which in turn is fed by drainage from the highlands of East Africa. The Mediterranean coasts of the Maghreb depend on direct rainfall, groundwater, and drainage from the Atlas Mountains. Without appreciable rainfall, the Sahara depends entirely on subterranean aquifers.

The Nile Valley. Almost all of Egypt's population and agriculture is concentrated in a narrow strip along the banks of the Nile and in the Nile Delta. Any serious disruption of the Nile's flow, whether due to climate change or human activity, represents a threat to Egypt. Upstream water diversion schemes by Sudan and Ethiopia have been a recurring source of regional tension, a dynamic that climatic stress is likely to intensify over the next 20 years. The probable direct effects of climate on the Nile's flow are less clear. The sources of the Blue Nile in Ethiopia and the White Nile in the East African Great Lakes region depend substantially on the monsoon rains originating in the Indian Ocean. Shifts in the monsoon will probably exert a greater influence on the fate of the Nile than climate change in North Africa proper.

Climate change within the region will nevertheless exacerbate a number of threats to the lower Nile and Nile Delta. Although sea-level rise is not likely to threaten most of North Africa's coast to 2030, much of the Nile Delta is already at or even below sea level. Even marginal sea-level rise combined with storm surges could create disastrous flooding in the delta. Egypt's second largest urban center, Alexandria, is at high risk for catastrophic flooding that could cause billions of dollars in damage and threaten millions of inhabitants. One of the principal reasons for construction of the Aswan High Dam, completed in 1970, was to control seasonal flooding along the Nile. As a result of doing

so, however, the dam reduced the replenishment of fertile silt, leading to erosion of the Nile Delta. Reduced flows also allowed encroachment of saltwater into the delta, contaminating the groundwater. On the other hand, the water impounded in Lake Nasser may provide Egypt with a means to compensate if climate change causes variations in Nile flow.

Threats to water quality and increasing urban demand for potable water will likely pose greater hydrologic challenges for Egypt than outright water scarcity. Water quality in Egypt is already poor, subject to pollution and high salinity, and causes a high incidence of waterborne illnesses and infections. Climatic stress on agriculture will likely cause greater use of fertilizers, contaminating drinking water. In the Nile Delta, salinization of groundwater resulting from over extraction will significantly reduce available potable water. By 2030, three-quarters of Egyptians will have inadequate access to fresh water.

The Coastal Maghreb. The Mediterranean and Atlantic coasts of the Maghreb have a wet-dry climate that on the one hand brings periodic and often sustained droughts and on the other hand causes occasional extreme precipitation that leads to flooding. Climate change will likely exacerbate both of these extremes. Droughts in the region are already increasing in frequency and severity; this trend will likely continue through 2030. Droughts have caused serious damage to agriculture in Morocco and Tunisia and could put tens of millions of North Africans at risk for water stress. Population, agriculture, and economic activity in the Maghreb are disproportionately concentrated in areas at risk for flooding. More frequent and severe floods will damage both urban and rural infrastructure, agriculture, and housing, as well as threatening water quality. In addition to low-lying coastal plains, the valleys of the Atlas Mountains in Morocco and Algeria and the margins of the periodic salt lakes such as Chott el Djerid in Tunisia are subject to flash floods due to extreme rainfall. A related threat from extreme rainfall is mudslides, particularly in Algeria where the Atlas Mountains rise steeply above the densely populated coastal plain. In 2001, extreme rainfall triggered mudslides in Algiers that killed over 500 people and generated significant urban unrest.

In addition to periodic extreme weather events (draughts and floods), the coastal Maghreb is projected to suffer an overall 12 percent decrease in annual precipitation to 2030. Given the existing high level of demand for water resources in the area, such a decrease will create major socioeconomic stress. Both urban and rural water distribution infrastructure in the coastal Maghreb is fairly extensive but inefficient and antiquated. Higher temperatures will increase evaporation, already a major cause of water wastage due to the widespread reliance on inefficient surface irrigation systems. Aside from major disruptions to rain-fed agriculture, reductions in runoff, reservoir levels, and river flows could lead to sustained urban water shortages. Water scarcity will likely become a major driver of sociopolitical unrest and migration.

In addition to rainfall, the other major water source is groundwater drawn from aquifers. The Maghreb's coastal aquifers face severe strain due to increasing rural and urban water demand. Climate change-induced reductions in precipitation will both increase reliance on groundwater and reduce renewal from runoff. In addition, coastal saline intrusion will contaminate coastal aquifers—saline contamination of drinking water is already a problem in Tunisia. The Maghreb states will increasingly need to tap into the inland

aquifers under the Sahara. Libya has taken the lead in doing so with its "Great Manmade River" (GMMR) project, and consequently will not face the same water stress its neighbors will suffer to 2030. The GMMR is tied to a prehistoric non-renewable water source that will ensure adequate water supply in Libya for at least the next half century. The supply life of the GMMR may be extended if other aquifers provide an additional water source or are found to be replenishable, however, there are no known Saharan aquifers of similar scale.

The Sahara. The socioeconomic impacts on North African states from climatic changes in the Sahara are likely to be minimal due to the lack of agriculture and low population. Many areas of the Sahara already experience decades without rainfall; climate change will only worsen conditions incrementally. The most significant regional impact may be the drawdown of Saharan aquifers that provide water to neighboring areas such as the Mediterranean coast and the Sahel. Drying and warming trends as well as depletion of aquifers may also accelerate desertification in the semiarid strip along the interior margins of the Atlas Mountains, an area disproportionately inhabited by Berber minorities. In addition, even marginal climatic shifts could put acute water stress on the isolated Saharan oases, which host densely concentrated populations living under very marginal conditions. Climatic stress on desert scrub vegetation will threaten the marginal grazing that underpins the nomadic, pastoral lifestyle of desert-dwelling Berber groups such as the Tuareg. The oases are also milestones on the trans-Saharan migration routes, and Sub-Saharan African migrants, who are often halted at the oases for considerable periods of time, are likely to suffer the worst privations.

Agricultural Challenges

Despite the region's aridity, North Africa hosts substantial agricultural activity in the Nile Valley and coastal plains and highlands of the Maghreb. Although agriculture is no longer the dominant economic sector in any North African country, it remains important in all but Libya.[4] Egypt accounts for roughly half the region's agricultural production, and Morocco and Algeria are also major agricultural producers. A disproportionately large segment of the labor force is engaged in agriculture, both directly and in the processing or trading of agricultural products, particularly in Tunisia and Morocco.[5]

Over the next two decades, climate change-induced stress on the agricultural sector will threaten the livelihoods and subsistence of millions across the region. The primary climatic challenges facing North African agriculture to 2030 are likely to be the aforementioned impacts on the region's already constrained water resources. Droughts, flooding, salinization, and overall water scarcity will adversely affect agriculture. Other climate change-related effects may have a more mixed impact. Whereas expected temperature increases and reduced growing areas and growing seasons will adversely affect agricultural productivity, carbon dioxide fertilization may sharply increase productivity in some cases. Climatic impacts on agriculture will depend on highly

[4] Agriculture accounts for 16 percent of GDP in Morocco, 13 percent in Egypt, 11 percent in Tunisia, 8 percent in Algeria, and only 1.7 percent in Libya.

[5] Agriculture accounts for 55 percent of the labor force in Tunisia, 45 percent in Morocco, 32 percent in Egypt, 17 percent in Libya, and 14 percent in Algeria.

localized conditions, the tolerances of specific crops, and the effectiveness of agricultural adaptation measures.

Egypt and the Maghreb have differing agricultural systems based on their differing hydrology. Egyptian agriculture is entirely dependent on Nile irrigation, while the Maghreb hosts a mix of rain-fed and groundwater-irrigated agriculture. In both cases, water availability is the decisive factor. In Egypt the scarcity of arable land is also a critical factor, and climate change-induced urban expansion and soil salinization will further reduce land available for cultivation. In addition to basic resource constraints, North African agriculture is characterized by significant inefficiencies in crop selection, irrigation practices, land management, and food distribution. Even where climate change does not substantially reduce productivity, more frequent agricultural disruptions and more variable conditions will substantially increase volatility in agricultural production. Population growth and more frequent droughts have already forced increased importation of food—due to its weak agricultural sector, Libya already imports three-quarters of its food. The region's cities already face perennial food scarcity and high food prices. All of the North African countries except Libya have price subsidies for basic foodstuffs, and price increases have been met by food riots. The need for price subsidies, more food imports, and investment in agricultural adaptation will increasingly constrain state budgets in the region.

Climatic stress may necessitate the substitution of hardier, less water-intensive crops such as maize, for current staples such as wheat and rice as well as greater reliance on fertilizers and intensive irrigation, further straining water resources. Although North Africa has high crop yields, agriculture remains highly inefficient with substantial potential for gains from mechanization, better irrigation, and other modern farming techniques. Such adaptive measures also will make agriculture less labor-intensive, further increasing the already substantial flow of population into North Africa's cities. Agriculture will be less able to act as an employment safety valve for underemployed or seasonally employed unskilled workers. Stress on rural communities may lead to civil unrest or encourage radicalization.

Demographic Challenges

Dramatic population growth over the last half century has seriously strained North Africa's limited resources and inadequate socioeconomic structures. Over the next two decades the effects of overpopulation and climate change will pose a mutually reinforcing threat to the region's water and food resources, economies, urban infrastructure, and sociopolitical systems. Harsher climatic conditions are likely to further concentrate population in the limited areas suitable for large-scale habitation. Population growth has produced a demographic "youth bulge"—some 60 percent of North Africa's population is under the age of 25. Fertility rates are declining in North Africa as family planning has improved. However, over the next two decades the region will have to contend with a large group of people passing through their most economically productive years without adequate employment opportunities.

Urbanization. Rapid urbanization has long been the source of significant disruptions in North Africa, and climate change will exacerbate these challenges. Although the current level of urbanization varies widely across the region, cities across North Africa are

experiencing a major influx of population from rural areas.[6] Morocco, Algeria, Egypt, and to a lesser degree Tunisia, already suffer from overpopulation in their major cities. Algeria, for example, has some of the world's highest per unit occupancy rates and faces a severe housing shortfall. The region's largest city, Cairo, is one of the world's most densely populated urban areas, with nearly seven million inhabitants in the city and a further ten million in the surrounding metropolitan area. Such concentrations of population will create major problems for Egypt and other North African states in managing water needs and other climatic stress. Worse, climatic pressure is likely to significantly increase rural-to-urban migration, further swelling excessive urban populations. Cities in North Africa face over-urbanization and under-urbanism—they have too many rural migrants who are not integrated into urban society or economic structures. Climate change will place additional stress on already inadequate urban infrastructure, exacerbating water, food, and housing shortages, poor sanitation and water quality, and inadequate employment opportunities. Urban heat waves will not only threaten public health but will have an adverse effect on economic activity as people stay off the streets. Conditions in the region's burgeoning urban slums ("shanty towns")—already incubators for extremism and urban unrest—will face the most degradation.

Economic Challenges

After varying degrees of socialist economic policies in the last century, in recent decades most North African states have undergone economic liberalization. The trend is toward increased privatization of state-run enterprises, diversification from agriculture or petrochemicals into light industry and tourism, and greater foreign trade and investment, particularly with Europe. Economic reforms have often been slow due to large, corrupt, and inefficient government bureaucracies and entrenched economic interests. Economic development has also failed to address major structural economic problems such as high unemployment, pervasive poverty, a lack of skilled labor, and over-dependence on externally determined rents from hydrocarbons, phosphates, tourism, and emigrant remittances. Nevertheless, the region will likely continue its trajectory toward greater economic liberalization to 2030.

With the partial exception of Tunisia, living standards among the general public across North Africa have not kept pace with economic growth. The centralization of ownership and revenues has concentrated economic benefits among the narrow political and economic elite. Gross income inequality is a major source of public disaffection in North African societies. The distinction between rich and poor is probably most stark in Morocco and Egypt, while Tunisia is more economically equitable if politically repressive. Poverty remains a major problem across North Africa, reducing state and social capacity and forcing states to subsidize basic necessities—Egypt spends roughly 7 percent of GDP on subsidies, a significant drain on the economy.[7] Climate change will only further impoverish the region through reduced agricultural productivity, over-urbanization, reduced employment opportunities, and higher food and water prices.

[6] The urban share of the population is 78 percent in Libya, 67 percent in Tunisia, 65 percent in Algeria, 56 percent in Morocco, and only 43 percent in Egypt.

[7] Some 23 percent live below the poverty line in Algeria, 20 percent in Egypt, 15 percent in Morocco, and about 7 percent in Libya and Tunisia.

Climate change-induced challenges will cause costly disruptions to North Africa's economic systems. Although the agricultural sector will suffer the most direct effects, the massive government expenditures required to head off or cope with climatic challenges will impact economies across the board. State investment and subsidies that still underpin much of the region's economic activity could be jeopardized. In addition, climate change mitigation will divert resources from programs to address poverty, unemployment, and poor living conditions, such as Morocco's National Initiative for Human Development (INDH). Collateral effects such as over-urbanization and sociopolitical unrest will further undermine economic performance.

Unemployment. North Africa's economic development patterns have failed to generate adequate urban employment for either skilled or unskilled labor. Economic growth has focused on non-labor-intensive sectors such as tourism or oil and gas. As a result, even oil-rich states such as Libya have massive unemployment.[8] Unemployment is most severe among the region's disproportionately large young population. In Algeria, for example, youth unemployment is estimated to be as high as 43 percent—the region's highest. Unemployment statistics do not tell the full story, however, because they do not account for the region's rampant underemployment. Many of the "employed" only work the equivalent of one or two hours per day, and many of the region's growing number of university graduates are forced to take low-paid jobs far below their skill level. Conversely, many of the displaced rural laborers moving into the region's cities lack the educational and technical skills necessary to succeed in a modern urban environment. The combination of urban economies incapable of creating adequate employment opportunities and a mass displacement of population from rural areas into cities as a result of climatic stress could create an employment crisis across the region. In Egypt, the return of up to half a million overseas workers as the Arab Gulf states slowly nationalize their own labor forces will compound the problem. Cities like Cairo, Casablanca, Alexandria, Algiers, and Oran are already overflowing with thousands of angry and unemployed young men who congregate in ghetto-like environments passing their days leaning on walls with little to no hope of escaping their fate.

Energy. Whereas the economies of Egypt, Tunisia, and Morocco are a diversified mix of services, light industry, and agriculture, the economies of Libya and Algeria are dependent on oil and natural gas exports.[9] Because climate change will not directly impact hydrocarbon extraction, unlike agriculture or tourism, these countries may prove more economically resilient to challenges that arise over the next 20 years. On the other hand, they face a grave threat from a likely reduction in hydrocarbon demand from Europe, which currently consumes the vast majority of North African hydrocarbon exports. Climate change will likely have a mixed impact on other aspects of the region's energy sector. More unreliable and infrequent rainfall will reduce the potential for hydroelectric power in the Atlas Mountains. On the other hand, the potential for wind and solar energy may increase.

[8] Unemployment is 30 percent in Libya, 14 percent in Tunisia, 12.5 percent in Algeria, 10 percent in Morocco, and 8.5 percent in Egypt.

[9] Hydrocarbons account for over 95 percent of export earnings and between a quarter and a third of GDP in Algeria and Libya.

Tourism. The expansion of tourism is an important aspect of economic growth and diversification in the region, particularly in Tunisia, Morocco, and Egypt. An ambitious plan to expand tourism over the next two decades is intended to provide a major source of revenue in the region, contributing significantly to spending on social development. Morocco, for example, has plans to develop six large new coastal resorts and boost tourism to 20 percent of GDP, surpassing agriculture. In addition, Morocco is becoming a popular location for Europeans to purchase holiday homes. Libya also plans to dramatically increase tourism, and Muammar al-Qadhafi's son Saif al-Islam has sponsored a "green" tourism project in Cyrenaica. Climate change poses a particularly acute threat to the tourism sector, since tourists will quickly elect to go elsewhere in the face of harsher conditions such as water scarcity and increased temperatures. In addition, tourist-oriented development is highly resource-intensive. For example, tourists consume far more water than local inhabitants and are far less likely to accept austerity measures. As climatic stress becomes more severe, the disproportionate resource allocation to foreign tourists is likely to cause increasing tension with local populations. It is already becoming an issue in Morocco's tourist centers such as Marrakesh and Fes Medina.

Civil and Key Interest Group Responses

Social Adaptive Capacity

North Africans have long lived close to the land and harbor no illusions about the challenges of contending with natural ecosystems. Over the centuries they have responded adeptly to drought, locusts, desertification, and water scarcity. In recent decades, North African society has changed significantly in response to social, economic, political, technological, and religious dynamics. It is unlikely that the next twenty years will see any less dynamism. The fact that the region is perceived as relatively static testifies to civil society's ability to adapt to or mitigate new conditions without fundamental disruptions. On the other hand, North Africa scores poorly on most social metrics linked to adaptive capacity. North African society is marked by a rigidity and brittleness that comes from underdeveloped civil societies and economies dominated by highly articulated authoritarian states. Sources of revenue and employment and channels of social and political expression are constrained to a few systemic avenues, making them vulnerable to critical failures. Moreover, the predominance of the state is likely to inhibit or overshadow adaptation at the level of civil society.

The level of human and social capital in North Africa has historically been relatively low. Tunisia has a substantial educated, cosmopolitan middle class but its social potential is inhibited by intense political repression. Social capital is nevertheless on an upward trajectory in North Africa. Education and literacy have expanded dramatically in Libya and are improving in the other countries as well, although Morocco lags with only a 52 percent literacy rate.[10] North Africa is producing more university graduates and educational and professional opportunities for women have also improved. Although improvements in higher education have not been mirrored by improved employment opportunities, educational trends suggest that the region will have a greater level of

[10] Literacy is 82 percent in Libya, 74 percent in Tunisia, 71 percent in Egypt, 70 percent in Algeria, and 52 percent in Morocco. Similarly, Libyans spend an average of 17 years in school, comparable to Europe, while the figure is 14 years in Tunisia, 13 in Algeria, and only 10 years in Morocco.

human capital that could potentially be applied to climate change adaptation and mitigation over the next two decades. In addition, many North African citizens exhibit a level of sociopolitical consciousness that creates the potential for social activism and political engagement, given a lessening of state repression.

Awareness of Climate Change

The technocratic elite and intelligentsia in North Africa are aware of the global debate on climate change, and especially the high level of attention to the issue in Europe. The latest Arab Development Report, for example, devoted significant attention to climate change. It is not clear, however, to what extent elites have internalized the implications of climate change. The prevailing attitude remains opportunistic, seeking ways to profit from climate change mitigation. Moreover, North Africa's educated and professional classes have learned to keep their opinions limited to "technical" or academic discussions. They avoid weighing in on state policy so as not to implicate their governments for lack of foresight in combating the effects of climate change. Those who criticize too loudly will not be tolerated at home; often their only resort is living and writing from exile. Ultimately, elite opinion about climate change may depend largely on the degree to which particular groups are or are not insulated from its effects.

Awareness of climate change as a coherent phenomenon is much more limited among the general populace. Nevertheless, many in the public are beginning to have to cope with the practical effects of climate change, such as water scarcity or higher temperatures, on a day-to-day basis. Whether they connect increasing hardships to a broader pattern of climate change will depend to a large extent on how the state-controlled media frame the issue. In addition, although domestic media in North Africa are strictly controlled by the regimes, there is wide access to satellite television channels such as al-Jazeera. Such outlets provide a means to circumvent state censorship and propaganda and allow citizens to hear alternative perspectives. Al-Jazeera and other international Arabic-language media could play a significant role in raising awareness of regional climate change and highlighting deficiencies in state responses. Nevertheless, an increase in social awareness of climate change is not likely to produce major change due to the lack of capacity for broad public opinion to decisively influence state policy.

Civil Society and the State

North African sociopolitical systems are characterized both by the decisive dominance of the state and by a deep divide between civil society and the state's ruling elite. Wealth, privilege, and power are overwhelmingly concentrated in the hands of a relative few. The attitudes and interests of these ruling elites will determine state policy on climate change, as on all other issues. Broader civil society across North Africa has been marginalized and suppressed. Since independence, many social groups have formed associations and social movements and engaged the state across a variety of socioeconomic, cultural, and political issues. In Egypt there are hundreds of registered nongovernmental organizations (NGOs). Such groups are co-opted by the state and tolerated only so long as they do not criticize the state or challenge state domination of the political discourse. As a result, civil society groups have been largely ineffectual and have minimal ability to influence policy. This has led to a pervasive sense of social powerlessness in the face of the state and a corresponding over reliance on state responses to challenges.

Climate change-induced challenges could galvanize NGOs and civil society to mobilize and advocate for reform, but such actors are unlikely to change the sociopolitical status quo. Ultimately, change in North Africa will in most cases depend on concerned groups garnering support from champions within the ruling elite. In Libya, for example, Qadhafi's son, Saif al-Islam, has promoted green development programs. Nevertheless, activism on climatic issues could strengthen the capacity of civil society over time, particularly where civil groups respond more effectively than the state. Civil groups may be more effective in responding directly to climate change-induced challenges at the grass-roots level than in attempting to influence state policy. The state, however, will set the parameters for how much civil activism is permitted. North African states presently remain strongly intolerant of direct or even indirect criticism of state policy or the ruling elite. Based on present political trends, an evolution toward greater openness and tolerance seems probable in Morocco and Algeria but less likely in Tunisia or Libya. However, current state attitudes are not a reliable indicator of how state-civil society relations may develop over the next 20 years. Periods of openness and repression in the region have been cyclical and unpredictable. For example, Tunisia was fairly open in the 1960s and 1970s but is now the region's most repressive regime. In contrast, Algeria has moved from tight control to a comparatively active civil society with regular strikes and challenges to the state.

Civil Responses to Climate Change

To a large extent the response of groups within North African civil society to climate change will be driven by how the state responds. Most civil responses to climate change are likely to manifest at the individual or local level—for instance, farmers changing planting schedules or irrigation methods and urbanites conducting more business at night to avoid the heat. The state is likely to inhibit social mobilization for larger-scale responses. If the state is able to respond effectively, civil society is likely to remain quiescent. The track record of states in the region, however, suggests that their responses to climate change-induced challenges may in many cases be deficient or seriously disruptive of civil society. State responses may involve large-scale disruption of social structures or local communities, such as by forcing relocation out of threatened areas or out of the way of public works projects. Since states in North Africa are largely organized for the benefit of narrow elites, the state's response is likely to focus on mitigation measures that benefit those groups. State responses and resource allocation decisions that manifestly disadvantage or disrupt some segments of society while benefiting others are likely to provoke civil dissatisfaction that may manifest in political unrest, radicalization, or social mobilization.

An acute state failure to address climate change that results in intolerable conditions for significant segments of the population may constitute a sociopolitical tipping point, in essence a breaking of the social compact between North African states and civil society. At that point, civil actors may determine that fundamental systemic change is necessary. The results of such a situation will depend on the specific reactions by state elites and by the public; reform, repression, or revolution are all possibilities. A combination of climatic stress and inadequate state responses over the next two decades could prove the catalyst for a major sociopolitical shift in North Africa. On the other hand, North Africans tend to hold a religiously based view that "what will be, will be." Owing to this

fatalistic mindset, North Africans are unlikely to blame the state for climate related stresses, making it more difficult to attain the aforementioned tipping point.

Islamism. Climate change-induced challenges over the next 20 years will provide a major opportunity for Islamist groups to step up as both effective civil responders and political challengers to North Africa's state elite. Islamist groups have emerged as the only viable opposition force because they have resisted state cooptation and because the state has blocked other avenues for social mobilization. In addition, they have established a track record of effective humanitarian responses to mudslides, earthquakes, and other natural disasters, often providing immediate medical, shelter, and food aid that are normally the responsibilities of the state. In many cases Islamist groups may fill the void left by inadequate state responses or the weakness of other types of potential civil responders. Moderate Islamist groups could play a constructive role, providing highly visible humanitarian assistance that empowers autonomous civil actors and contrasts with ineffectual state responses, thus pressuring state actors to respond more effectively. Moderate Islamists could use the climate change mitigation issue to bolster their argument that existing North African governments are illegitimate and exploitative, creating momentum for political reform.

On the other hand, Islamic extremists across the region may exploit climate change's destabilizing impacts and ineffective state responses to promote the spread of militancy and anti-regime violence. Indeed, Islamist militants could point to climate-induced catastrophes as evidence of God's wrath against "apostate regimes" whose un-Islamic behavior has plunged the region into desperate circumstances. Alternatively, climate change could be cast as yet another outrage perpetrated by the West, an argument Usama Bin Ladin has made in the past. Moreover, Islamic extremist groups could take advantage of dire socioeconomic conditions to recruit more followers, particularly among disaffected youth in the shanty towns of Morocco and Algeria. The concentration of unattached, unemployed young men in overstressed North African cities as well as disaffected, marginalized rural communities under acute climatic stress will provide ideal recruiting grounds for extremists.

Internal Migration. Climatic stress will add to the already substantial movement of population from rural areas into cities, exacerbating the region's serious urban challenges. For the most part, such migration is unlikely to differ in kind from existing rural-to-urban migration patterns. It will generate higher unemployment, further strain on urban resources, further expansion of shanty towns, and increased social friction. The decisive question will be whether increased migration reaches an urban tipping point after which the region's cities begin to suffer critical failures of infrastructure, services, economy, and society. In turn, that may depend on the manner and degree to which the state intervenes to sustain urban systems.

Climate change-induced migration may also include patterns other than persistent rural-to-urban migration. In Morocco, for example, cyclical fluctuations in agricultural production have produced a corresponding cyclical migration back and forth between rural and urban areas. To the extent that climatic impacts exhibit a similar fluctuation in intensity, they may produce similar transient migration. In addition, differential climatic impacts in particular areas may drive rural populations to migrate into new rural areas

with more abundant resources and less climatic stress. Because such areas are bound to already be inhabited, such movements are almost certain to cause resource conflicts and extend the collateral effects of climate change even into less directly affected areas. In addition, the combination of water scarcity and stress on marginal agriculture could drive more Berber-speakers into Arab-speaking coastal communities, creating a potential for ethnic conflict.

Prospects for Civil Conflict

Climate change-induced challenges have great potential to aggravate North Africa's existing ethnic, sectarian, and social rivalries, potentially generating destabilizing internal conflicts. The region's court systems and other mechanisms for conflict resolution are weak, and mechanisms for cooperative interest aggregation have been deliberately suppressed by the state. As a result, groups under climatic stress are likely to resort to conflict rather than working together. At the most essential level, climate change-induced civil conflict will involve conflict for scarce resources such as water, arable land, food, or employment. The competition for arable land and water is perhaps the most salient of all issues in the region; it also underlies the conflicts in neighboring Darfur, Chad, Niger, and Mauritania. Such resource conflicts will often manifest themselves along inherent cleavages or fracture lines in North African societies. In the face of climatic stress and resource competition, social groups are likely to fall back on primordial ties of family, tribe, and religion. Ethnic, sectarian, and sociopolitical differences which in their own might not lead to outright conflict may be far more contentious when mobilized as expressions of underlying resource conflicts.

The most likely and obvious avenue for civil conflict in North Africa is the ongoing regional struggle between secular and fundamentalist elements within Islam, and by extension between radical Islam and the state. Climate change-induced challenges over the next two decades may well play to the advantage of militant groups. As previously noted, climate change and inadequate state or secular responses to it may be readily incorporated into Islamist groups' complex of grievances. Climatic challenges will divert the resources and attention of the state as well as potentially further discrediting it while creating conditions favorable to radicalization and jihadist recruitment. In Egypt, sectarian conflict also could arise between Muslims and Coptic Christians as desperate socioeconomic conditions take a toll on a population in search of scapegoats. Some 9 percent of Egypt's population is Coptic, the region's only sizable religious minority.

Although North Africa is not an ethnically diverse region, an important cultural faultline exists between predominantly coastal Arab-speakers and the Berber-speaking groups of the interior. The Maghreb states have made repeated efforts to assimilate or suppress the culture and language of the Berber-speakers. In Algeria this has led to confrontations between Berber groups such as the Kabyles of the central Atlas Mountains and the government. Because they are concentrated in marginal areas such as the Saharan oases and the Atlas Mountains, Berbers are likely to suffer disproportionate climatic stress. This could exacerbate clashes with the state or with Arab-speaking groups, particularly in combination with migration. Berber identity could become a rallying point for broader socioeconomic or environmental grievances.

Setting aside ethnic and sectarian divisions, the divide between the ruling social, economic, and political elite and the public at large has obvious potential to define climate change-inspired grievances. The region's weak social contracts have always implicitly distinguished between the privileged and the masses, and elites are likely both to suffer the least and receive the most state assistance in the face of climate change. A major climate change-induced disparity in conditions, resource access, and state assistance could generate rioting, anti-state violence, and even a revolutionary atmosphere. Because it is directly threatening to the ruling elite, conflict along socioeconomic lines is even more likely than other forms of civil unrest to prompt a swift and violent state response. The greatest socioeconomic disparities and therefore the greatest potential for class-oriented conflict are found in Morocco and Egypt.

Prospects for Social Collapse. Although social collapse facilitated by environmental degradation has taken place in Darfur and to some extent in the Horn of Africa, climate change to 2030 is very unlikely to prompt a general structural collapse of North African societies. Both cities and rural areas will face acute stress, but the preponderant role of the state is likely to mitigate failures of social institutions and maintain a minimal level of social order. Nevertheless, patterns of urbanization and migration probably will create widespread disruption and attenuation of existing societal structures, whether family, community, or clan. The growing prevalence of young, unemployed men without families in urban centers creates conditions for social atomization and the creation of new social structures such as radical networks or gangs. Under such conditions, a serious climate change-induced crisis such as an acute water or food shortage could lead to localized social collapses within shanty towns or in marginal hinterland territories. The response of the state to such a localized crisis will be the key consideration—the failure of social support structures would create abject dependence on the state. Absent a robust state response, such a situation could lead to rioting, a surge in internal migration, or the rise of alternative service providers such as Islamist groups.

State Responses

All five North African states have similar political systems. Regardless of the differing trappings of monarchy, revolutionary heritage, or republicanism, all are governed in an authoritarian fashion by autocratic elites. All five states are highly centralized, with final authority concentrated within a small elite group. The state maintains a predominant position relative to civil society and the public, using coercion and consensus to achieve social acceptance of the existing system. Although the level of repression varies between states, with Tunisia and Libya the most extreme, and has varied cyclically over time, authoritarian regimes are well entrenched in every state in the region. Each of the five North African states is headed by a leader who promotes a cult of personality to serve as the legitimizing instrument for his rule, the most extreme examples being President Zine El Abidine Ben Ali of Tunisia and Muammar Qadhafi of Libya. The essential authoritarian character of North Africa's political systems is not likely to change over the next 20 years, even if other circumstances in the region shift significantly. Climate change seems unlikely to be a catalyst for political reform. The region's authoritarian regimes have weathered the international and domestic challenges and dynamism of the past half century and are likely to persist through 2030, although perhaps in a weakened and unstable form.

State Decision-Making

State policy decisions in North Africa are made in the context of very narrow elite interests concentrated at the top of the political pyramid. Decision-making is unpredictable because so few people make the decisions. While this system subordinates broad public interests to those of a few leaders, it also allows the state to rapidly shift gears and mobilize to tackle issues that the key decision-makers identify as critical priorities.

State Priorities. The consolidation and maintenance of political and economic power by the ruling elite trumps all other state priorities. State elites are determined to sustain their authority at any human, financial, social, or political cost. To the extent that climatic factors generate major threats to regime survival in North Africa, they will attract resources and attention. The central concern of state leaders, however, is more likely to be controlling the sociopolitical implications of climatic challenges rather than mitigating the problems themselves. Their approach may therefore overemphasize security responses rather than holistic social, political, economic, and environmental ones. Adherence to legal niceties and international agreements will be contingent on the requirements of regime security. The gap between what North African states are legally committed to and what they actually do remains wide and is expanding. On the other hand, North African states have always faced resource constraints and environmental challenges, so awareness of the need to manage such issues is high in the region. Resource management and dealing with environmental challenges are recognized priorities that will receive state attention even if they do not rise to the level of major challenges.

Elite Attitudes Toward Climate Change. Ruling elites in North Africa do not see climate change as an immediate threat to their authority. They therefore feel free to take an opportunistic attitude toward climate change, supporting climate change mitigation policies that have collateral economic or political benefits to their particular interests. By the same token, elites are aware that concern over the environment and climate change plays well internationally, particularly in Europe, making green initiatives and climate change mitigation politically advantageous. In addition, elites are conscious of the potential for climate change-induced civil unrest and socioeconomic instability and have an incentive to take measures to diffuse them. They are highly unlikely to countenance measures that involve broad social mobilization or social disruption, both of which are potential threats to their political security. Generational turnover in leadership over the next 20 years is unlikely to decisively alter underlying elite attitudes and objectives. For example, younger leaders such as King Mohammed VI in Morocco and Muammar Qadhafi's son, Saif al-Islam, in Libya have shown interest in environmental and climate issues. Their policies, however, have exhibited the same political calculus and are rooted in the same authoritarian system as their antecedents.

State Capacity

North African states have historically proven able to withstand sustained environmental, political, social, and economic changes and challenges. State structures in the region have been so resilient that the resulting perception of political stasis has masked the region's dynamism in other areas. The extraordinary tenacity of North African regimes provides a reserve of state resilience that has allowed them to maintain power in defiance

of expectations. This resilience has not necessarily translated into effectiveness in tackling national and regional challenges, however. State capacity in areas other than regime security has often proven inadequate and unresponsive. Be it Morocco's Makhzen or Algeria's "Le Pouvoir," the entrenched and ossified political system has produced stagnation and an inherent inability to develop and implement necessary reforms. The state bureaucracy lacks latent reserves of dynamism, ingenuity, or the institutional capacity to rise to the challenges presented by climate change. In addition to the direct implications for future responses to climate change, ineffective state action on a wide range of other issues has created a host of competing deficiencies which will divert already limited state resources.

The dominance of the state sector means that North African states have control over a large proportion of national resources, which taken in aggregate are considerable. The centralization of control of national resources under the state is accompanied by intense politicization of resource allocation. Scarce resources, such as water, are allocated according to political favoritism and patronage systems rather than need or rational distribution. These allocation decisions made by a few elite actors may have a greater impact on scarcity and efficiency of use than direct climatic effects. On the other hand, this central control should allow North African states to undertake large-scale civil engineering and climate change mitigation. Governments of these states have shown the capacity to successfully tackle massive civil infrastructure projects, particularly in the area of water resource management—critical to climate change mitigation. Egypt's Aswan High Dam and Libya's Great Man-Made River are examples of the types of projects that will be increasingly necessary over the next 20 years. Egypt has launched the New Valley Project to divert water from Lake Nasser to irrigate the Toshka Depression in the Sahara, significantly expanding the country's agricultural land and living space by 2020. The efforts expended on such ambitious projects, however, have not always been matched by sensible planning—Libya's failed attempt at irrigated oasis agriculture at Al Kufra is one example.

States in the region may prove far less able to tackle the sustained, widely distributed impacts of climate change on their populations than in responding with massive civil engineering projects. North African states have shown longstanding inability or unwillingness to respond to public needs and provide services. The prevailing systems of patronage and corruption inhibit state institutions from functioning in a consistent, professional manner. The wide state-society divide creates state institutions that are not accustomed to being responsive to public concerns and grievances. North African governments have instead shown a tendency to react to public grievances by attempting to avoid or suppress them rather than address them. These deficiencies are unlikely to improve over the next two decades and may be worsened under increasing resource pressure. This could become a serious source of destabilization as climate change causes serious public grievances to proliferate.

Climate Change Mitigation and Development Planning

Most climate change mitigation in North Africa will be undertaken as a result of discrete decisions in response to specific climatic impacts rather than as a result of holistic mitigation planning. Mitigation measures will vary down to individual areas and communities within states, as well as differing according to the specific perspectives of

the elite decision-makers who champion them. Nevertheless, because of the region's perennial resource scarcity, North African states are accustomed to conducting significant amounts of development planning. Development planning, infrastructure design criteria, and economic policies over the next two decades will be forced to take the impacts of climate change into account. The future viability of North African development plans will depend on whether climate change produces incremental changes in conditions or a radical discontinuity. In addition, North African development models from the colonial period to the present have emphasized water-intensive economic activities such as inefficiently irrigated agriculture, tourism, phosphate processing, and light manufactures. Plans for future development build on this legacy, with particular emphasis on European tourism. Hotels, resorts, and golf courses create very high hydrologic demands; climate change may not be reconcilable with this development model. For countries such as Morocco, Tunisia, and Egypt, where tourism is a key component of the economy, pressures to alter development patterns that reduce water usage, limit building expansion on arable land, or suspend highway construction, will be very difficult. Libya's nascent tourism industry has far fewer vested interests in existing patterns, and Libya is developing "green" tourism in Cyrenaica.

Water resource management will be the most important aspect of climate change mitigation in North Africa. North African states are accustomed to sustained water resource constraints and have institutional experience planning for and managing water resources. One likely response is more investment in desalinization plants as the increased costs of scarce water makes them more economically viable. Libya is already investing significantly in desalinization research and other states are likely to follow suit. All North African states will need to significantly upgrade urban water infrastructure. The Maghreb states are likely to increase construction of reservoirs, dams, and other water management infrastructure in the Atlas watershed. Additional states are likely to follow Libya's example and invest in major infrastructure projects to tap into Saharan aquifers. In Egypt, water management infrastructure projects on the Nile are likely to be expanded. Mega-projects such as the New Valley Project will need to be carefully assessed in terms of gains in arable land versus strain on water resources.

Although North African farmers have proven adept at adapting individually, many of the problems agriculture will face will require major state-level intervention and investment. To mitigate harsher and more variable growing conditions, states will need to update rural infrastructure, particularly irrigation systems; encourage and subsidize crop substitution away from rice and wheat toward more temperature and water stress-resistant crops such as maize; and adopt more efficient land use patterns. Overall, maintaining the agricultural sector will take a larger share of state budgets. As climate change-induced disruptions increase volatility in production and prices, states will need to increase market intervention to stabilize and subsidize prices and supplies or face widespread social unrest. Increasing dependence on food imports will eat into state revenues.

One of the most complex aspects of climate change mitigation will be addressing the expected growth and climatic stress on North Africa's cities. North African states have been ineffective in managing urbanization. Since state policies will focus on the needs of the privileged and of foreign visitors, the wide disparity in levels of infrastructure,

services, and standards of living between districts in the region's cities will likely worsen. As state resources become increasingly tight, the shanty towns may receive only the bare minimum of development attention.

Because North Africa is not a major direct contributor to global greenhouse gas emissions, it faces less international pressure than other regions to mitigate the causes of climate change. Libya and Algeria, however, are major suppliers of fossil fuels to Europe, so their indirect contribution to European emissions is considerable. Oil and gas production are essential to economic development in Libya and Algeria, and these countries have no interest in limiting exports in order to curb emissions. Indeed, they will do as much as possible to sustain rather than diminish consumer dependence on hydrocarbons. European policy will ultimately determine how the contribution of North African oil and gas to global emissions is addressed.

Social Control

The implications of climate change in North Africa—notably migration, stress on both rural and urban areas, unemployment, and increased resource competition—are likely to generate volatile sociopolitical conditions that will pose significant threats to the existing political structure. The responses of North African states to these threats may be more decisive for the fate of the region than their direct responses to climate change impacts. North African states have robust capacity to maintain social control in the face of domestic challenges and destabilization. Regimes depend on a combination of entrenched patronage systems, robust *mukhabarat* (security) apparatuses, and the support of external allies—a combination that has proven highly effective at maintaining political control. They have a track record of effectively suppressing dissent and unrest or remaining resilient where unrest has persisted, such as the civil conflict in Algeria.

States in the region may seek to suppress or distort information on climate change-related challenges. They seek to control access to any information that could provide a basis for opposition to the state, even information as seemingly innocuous as census data. The proliferation of new media and alternative information sources, however, will make it difficult to maintain such censorship. North African regimes are also adept at deflecting blame, and policy failures may be attributed to sub-ministerial-level bureaucratic scapegoats or foreigners. In addition, all states except Libya have exploited so-called "democratic elections" as a way to demonstrate to their own people and outside observers that they are responsive to rising expectations and accountable to the public.

State-civil society relations in the region are cyclical and specific dynamics will vary between states. Overall, however, increased climatic pressure to 2030 is unlikely to facilitate moves toward greater openness, reform of political institutions, or democratization. Climate change-induced increases in unemployment, derailment of economic progress, and increased public disaffection will make it less "safe" for elites to allow the public more voice. North African states may instead respond to this challenge with widespread repression, human rights violations, and suppression of civil society, NGOs, independent media, and other dissenting voices. Security forces are more likely to be used to suppress civil reactions to climatic crises rather than to provide humanitarian support. More states are likely to adopt Tunisia's practice of systematically isolating, opposing, and ultimately eliminating any opposition. In the process, they are

likely to damage overall adaptive capacity by inhibiting constructive contributions by civil actors.

Prospects for State Failure

North African states are far more likely to face conditions of pervasive instability than instances of outright state failure. The same factors accounting for state resilience that have allowed regimes to persist and even strengthen for decades despite perennial predictions of collapse are likely to forestall systemic state failure to 2030. In addition to robust internal security capabilities, which can be mobilized to suppress unrest brought about by climatic crises, North Africa's European partners will step in to prevent state failure. The dynamics of shifting factions and interest groups further mitigate the potential for collapse. States may respond to stress with coups or factional "regime changes" that rearrange the leadership hierarchy without altering the underlying political system. Ultimately, the state system is likely to persist as long as the regime connections (*wasta*) and patronage networks continue to secure the loyalty of the elite classes, the military, and the security services.

The stress associated with climate change coupled with an ineffective government response could nevertheless significantly undermine the social fabric and state institutions. The state-society divide remains wide and deep with the potential for civil unrest and political instability always present. A severe climatic crisis combined with other acute challenge could potentially bring about partial of state failure. While regimes may remain in power by force even while public services, governance, and most institutional state functions fail, the implications for the population and socioeconomic system would be dire. Under this scenario, there may be swaths of territory that are ungoverned, "no-go" zones in urban areas, and huge segments of the population living in abject poverty. Failed-state conditions may prevail in certain areas while the state as a whole continues to function at a reduced level. If the state and existing socioeconomic systems are unable or unwilling to provide basic services, people will turn to alternative sources. Examples in the Horn of Africa and elsewhere suggest that a combination of Islamist organizations, tribal or clan militias, and criminal networks are likely to step in to compensate for the lack of state-provided services. The most likely alternatives are Islamist groups, which in some areas already have become the main service providers.

Regional Implications

North Africa in many respects comprises two distinct regions: the Maghreb (Morocco, Algeria, Tunisia, Libya, as well as Mauritania and Western Sahara) on the one hand, and Egypt (as well as Sudan) on the other. Whereas the Maghreb looks to Europe, Egypt is oriented more toward the Middle East and the Arabian Peninsula. Turkey is the development model for Egypt, not Western Europe. The dialects, dress, and lifestyles are different—in the Maghreb people eat couscous, in Egypt they eat bread. Egypt's hydrology and agricultural practices are markedly different from those of the Maghreb. As a result, the two sub-regions will face differing types of climatic mechanisms. In sum, there is much that divides Northwest from Northeast Africa and relatively little that unites the two subregions.

Prospects for Regional Cooperation

Interstate relations in North Africa are characterized by competition and rivalry rather than cooperation. For example, the border between Morocco and Algeria has been closed since the mid-1990s due to continued sparring over Western Sahara. States in the region tend to view regional challenges such as climate change and environmental degradation in zero-sum terms. They rarely adhere to the diverse legal arrangements, treaties, and constitutional provisions that commit them to cooperation on environmental protection, desertification, illegal immigrants, and other issues. The lack of regional cooperation is a major limitation on the region's overall capacity to confront climate change-induced challenges. Ideally, North African states could respond to the challenges of climate change by setting up critical regional institutions to foster cooperation and the adopting joint policy responses. North African states enjoy complementarities in terms of distribution of natural and human resources—Tunisia providing human capital, Libya and Algeria possessing significant hydrocarbon reserves, and Morocco and Egypt serving as major agricultural producers. Cooperating while playing to their comparative advantages would enhance regional adaptive capacity.

Climate change is one of the few cross-cutting issues with the potential to spur more serious efforts at regional cooperation. In the same way that a common threat from Iran and Iraq prompted the states of the Persian Gulf to form the GCC, a common threat from climate change could facilitate regional integration in North Africa. While climate change-induced challenges might promote greater horizontal cooperation across North Africa, however, they are more likely to increase interstate competition and conflict. The regional bias in favor of competition, self-interest and mutual suspicion among state leaders, and pressure from resource scarcity work against the development of a cooperative approach.

Regional Integration. To date, regional integration in North Africa has been an elusive goal despite a common culture, language, religion, and set of environmental challenges. Initiatives such as the Arab Maghreb Union (AMU) have stalled due to a combination of civil unrest, economic turmoil, and interstate tensions. Established in 1989 with the aim of working toward a common market and coordinated economic policies, the AMU is modeled in part on the European Common Market and in part on the Gulf Cooperation Council (GCC) of the Persian Gulf. Of the various African and Arab multilateral organizations, it comes closest to encompassing the region of interest, including Morocco, Algeria, Tunisia, and Libya, as well as Mauritania, but excluding Egypt. Other regional institutions, such as the African Union, the League of Arab States, or the Tripoli Charter among Egypt, Libya, and Sudan, offer even less promise as bases for regional integration. Prospects for genuine regional integration will likely remain poor over the next two decades. In any case, multilateral institutions are very unlikely to be sufficiently empowered to play a significant role in addressing climate change in the region.

North Africa and Europe

The most important regional relationship for the Maghreb states is with Europe, particularly the Southern European states of France, Spain, and Italy. Geographically, Southern Europe is nearly as close to the population centers in the region as those countries are to each other. Egypt is a separate case, with stronger ties to the United States and the Middle East than to Europe. This difference reflects the division between

the eastern and western Mediterranean basins which has persisted since ancient times. Past colonial ties continue to dictate the relative weight of relations between individual European and Maghreb states—France is closely tied to Algeria, Tunisia, and Morocco; Spain to Morocco; and Italy to Libya. Beyond the legacy of colonialism, the European Union (EU) pursues a "hub and spoke" approach to engagement, forging individual ties with each Maghreb state rather than treating the region as a whole. This encourages a "stovepipe" pattern of relations in which the Maghreb states compete with each other to build ties to Europe rather than building up cooperative capacity within North Africa. This approach both decreases North Africa's leverage vis-à-vis Europe and inhibits movement toward regional cooperation. Although Europe has the influence to promote North African regional cooperation, its policies tend to have the opposite effect—potentially to the detriment of both regions.

In many respects, the states of the Maghreb have closer relations with Europe than they do with each other. They tend to look north to Europe for largesse and solutions rather than laterally to their neighbors. Although the bulk of the Maghreb's trade and foreign investment is oriented toward Europe, in many respects the economic linkage is a shallow one, centered on European tourism as well as North African energy and agricultural exports. Despite Europe's demographic decline and North Africa's labor surplus, European business engagement with North Africa is relatively modest, in part due to inadequate levels of human capital. In response to illegal immigration, drug trafficking, and terrorism, security ties have grown much more robust in recent decades; this trend is likely to continue through 2030.

Cooperation on Climate Change Mitigation. Although Southern Europe and the Maghreb may face similar climatic changes over the next two decades, their different sociopolitical systems will produce divergent collateral challenges. Nevertheless, the prospects for cooperation with Europe in addressing climate change-induced challenges are better than those for cooperation between North African states. Europe's main interest lies in preventing spillover from climate change-induced instability in North Africa, principally in terms of migration, but also access to energy, terrorism, and transnational crime. As with the North African states themselves, Europe's concern for direct climate change mitigation in North Africa is overshadowed by the need to address the security challenges arising from climate change. Nevertheless, Europe advocates strongly for greater policy sensitivity to climate change in North Africa and is likely to provide large and comprehensive climate change mitigation aid packages to its North African partners. Ultimately, Europe has a strong interest in averting state failures or social collapses in North Africa and has the resources to step in to prevent such developments. In the event of climatic-induced crises, European intervention may constitute the last line of defense of the North African state.

***Regional Energy Issues*.** Libya, Algeria, and to a lesser extent Egypt are major energy suppliers to Europe and are likely to remain so to 2030. Although Europe is likely to reduce its dependence on oil in an effort to curtail greenhouse gas emissions, demand for natural gas is likely to increase as an alternative. All three North African energy producers have substantial natural gas reserves, particularly Algeria. Europe has a strong interest in expanding gas ties with North Africa to diversify its gas supply away from dependence on Russia. Europe's energy relationship with North Africa will become

more hardwired as additional gas pipelines to Spain and Italy come online over the next two decades. As with other aspects of trans-Mediterranean relations, North African states have competed more than cooperated with each other in pipeline construction.

In addition to natural gas, North Africa has the potential to become an exporter of solar or wind-generated electricity to Europe. Construction of solar arrays in cloud-free North Africa connected to Europe via high tension power lines could become a second energy link between the two regions. Besides the direct energy benefits, Europe could situate solar energy projects in non-gas-producing states in order to dilute the threat of energy monopoly. Both gas and solar energy development in North Africa would have the collateral effect of providing employment and revenues in the region that might diminish the incentive for emigration to Europe and increase adaptive capacity. On the other hand, these industries are not labor intensive and the state would appropriate most of the revenues.

Cross-Border Migration

The threat that climate change to 2030 will drive major increases in cross-border migration is one of the principal preoccupations for Europe and the North African states. North Africa is both a source of migrants and a transit region for external migrants. Both of these dynamics are likely to be significantly expanded by climatic stress in Africa, and both are directed primarily at Europe. Although migration probably will have less direct adverse impact on North African states than other climatic challenges, it is likely to be the principal manifestation of climate change-induced spillover into Europe. To date, the vast majority of cross-border migration from and through North Africa has been economically or politically driven, rather than environmental. This pattern will be altered as climate change affects North Africa more significantly, but the degree to which it will drive increased migration remains unclear. As climate change impacts are felt more strongly in the Sahel and Sub-Saharan Africa, however, they will become leading drivers behind the larger African migration pattern northward toward Europe.

Climate change is likely to render North Africa a less attractive final destination for migrants even as it increases transmigration into Europe. High levels of climatic stress and rampant unemployment in the North African states not only are intrinsic deterrents to immigration but will cause states in the region to take more strenuous steps to curb migration. For the same reasons, sustained climate change-induced challenges are not likely to result in substantial horizontal migration between the North African states. Although localized crises might propel transitory intra-regional migration flows, North Africans will most likely continue to migrate out of the region rather than within it.

North African Emigration to Europe. North African emigration to Europe, much of it illegal, is already a major regional dynamic and will only become more so as a consequence of climate change. North African immigrants form a major segment of Europe's Muslim population, and North Africa is the primary focus of European concerns about immigration. Many North African immigrant communities are now well established and increasingly demographically important in Europe. Although the most prominent such community are the Algerians in France, Europe also hosts large Moroccan and Tunisian communities. Recently, migration from Egypt and Libya has also increased. While second- and third-generation North African immigrants have

moved into professional fields throughout Western Europe, recent immigrants still tend to occupy unskilled laboring positions and are mainly concentrated in Southern Europe. In addition to permanent migration, large numbers of seasonal migrants travel to Southern Europe, principally to work in agriculture. Spain's proximity to Morocco and the remaining Spanish enclaves of Ceuta and Melilla on Morocco's Mediterranean coast permit a major flow of Moroccan day laborers to Spain.

The demographic ascension of Europe's Muslim population is an increasing concern to European governments, both in terms of the alteration of European cultural, ethnic, and religious composition and the threat from Islamic extremism. As a result, North African immigration is a high-priority security and foreign policy issue for Europe. Although not explicitly opposed to immigration, European authorities seek to curb illegal immigration and regulate if not reduce legal migration. Although the Southern European states could bolster their practical capabilities to interdict illegal immigrants coming across the Mediterranean, they are inhibited by legal constraints. EU laws and procedures on migration, human rights, and asylum seekers render it difficult for European countries to turn away African immigrants. Because immigrants can claim EU legal protections if they reach EU territory, many migrants travel to outlying European territories such as the Spanish enclaves of Ceuta and Melilla, the Canary Islands, Lampedusa, or Malta.

North African states have an interest in promoting continued robust emigration to Europe. Emigration acts as a "safety valve" to alleviate pressure on resources and employment in North Africa. Climate change is expected to significantly exacerbate both of these challenges; thus continued emigration will become even more important to North African states over the next 20 years. In addition, North Africans in Europe provide remittance revenues that play a significant role in North Africa's economies. The challenge for North African states is to overcome European aversion to such migration. To that end, North African authorities may increasingly seek to manage emigration flows while engaging closely with Europe on migration issues. North African states have shown willingness to provide social services and other support for their expatriate communities. The trump card in securing European concessions on North African immigration appears to be the even greater European aversion to Sub-Saharan African migration. The next 20 years are likely to see a grand bargain between Europe and North Africa on migration. In essence, such a bargain is likely to involve European acceptance of regulated North African immigration in exchange for North African efforts to curb migration from further south.

Egyptian emigration is also an important regional issue, although it is currently oriented to the east rather than the north. Egyptian migrant workers customarily go to the Persian Gulf, not Europe. Remittances from the hundreds of thousands of Egyptians who work in oil-producing countries constitute Egypt's single greatest source of foreign exchange. In recent years, however, Saudi Arabia and the Gulf States have sought to nationalize their labor force, displacing Egyptians and other guest workers with locals. Returning migrant workers will swell the ranks of Egypt's unemployed, multiplying the destabilizing effect of climate change on the country. Over the next two decades, Egyptians are likely to look increasingly toward Europe, potentially adding a large demographic boost to migration flows.

Sub-Saharan Migration. Although the Sahara Desert represents a substantial barrier to migration, it has not prevented a perennial migration flow from the south along traditional routes through the desert oases or along the Nile. Current levels of migration from the south are manageable in size, but they may increase significantly as a result of climate change. The marginal agricultural and pastoral systems of the Sahel—as well as Mauritania and Western Sahara—are already under severe threat from desertification, drought, overgrazing, and overpopulation. Over the next two decades populations both in the Sahel and further south in West Africa and Equatorial Africa are likely to suffer severe climatic challenges, exacerbated by low levels of state and social adaptive capacity. One of the principal climate change-induced concerns in the Sahel is the fate of Lake Chad. The lake has been shrinking dramatically for decades due to a combination of human and environmental factors and may disappear altogether as a result of climate change. Lake Chad provides water to over 20 million inhabitants of Chad, Cameroon, Niger, and Nigeria. Under such conditions, North Africa will receive large immigration from Sub-Saharan Africa, although the potential magnitude is unclear. The direction of migration flows within Sub-Saharan Africa is difficult to predict, and many migrants may not attempt to cross the Sahara. Climate change, particularly water stress on the oases, may render the desert even more inhospitable to migrants. Large-scale refugee flows in Sub-Saharan Africa, such as those resulting from conflicts in the Congo, Rwanda, and Burundi, have tended to move fairly short distances into refugee camps in neighboring countries, while the Sahara crossing is approximately 1,000 miles.

Moreover, North African states are already beginning to take harsh action to curtail migration. Migrants are often interned under very poor conditions in Saharan oases such as Al Kufra in Libya, where they suffer considerable abuse and are prey to the slave trade and other forms of exploitation. North African states have also parlayed European fears of mass influxes of Sub-Saharan African migrants into assistance in setting up internment camps, increasing border security, and implementing deterrent measures such as improved services in countries of origin. Libya, the main transmigration route, has received major funding from Italy for migration control measures.[11] Such European assistance is likely to increase considerably through 2030 as a preventive measure even if actual migration flows prove less than anticipated. Europe seeks to build a *cordon sanitaire* against Sub-Saharan African migration in North Africa. European states may be willing to turn a blind eye to North African human rights abuses of migrants as long as migration flows are kept under control.

In addition to interned transit migrants, increasing numbers of Sub-Saharan Africans are settling in North Africa, either by choice or because their entry into Europe is frustrated. Faced with anticipated soaring unemployment and resource constraints, North African states have limited capacity to absorb immigrants. Expansion of immigrant minorities is likely to worsen social tension and could spark ethnic violence. As a result, it is in the interest of North African states to pursue a binary outcome in terms of transmigration—either a smooth and continuous flow into Europe, or the wholesale prevention of immigration across their southern borders. European preferences and aid will drive them

[11] Some 70 to 80 percent of the 65,000 to 120,000 annual Trans-Saharan migrants in the Maghreb transit through Libya, with the remainder moving through Algeria and Morocco. Egypt also receives large numbers of Sudanese migrants.

toward the latter course, which is likely to involve widespread human rights abuses and possible conflict with southern neighbors. In addition, an influx of Sub-Saharan African migrants into Europe would increase competition with North African migrants. Reduced access to employment opportunities in Europe would endanger both revenue from remittances and Europe's role as a "safety valve" for North African unemployment.

Prospects for Regional Conflict

The anticipated impacts of climate change in North Africa will likely increase the potential for regional conflict, particularly over scarce water resources. Most North African interstate conflicts are likely to remain localized and bilateral, in part because of the great distances between population centers. As water grows increasingly scarce, competition for trans-border water resources such as the Nile and the underground aquifers of the Sahara will become fiercer and could devolve into outright hostilities. Beyond the potential for "water wars," the legacy of colonial borders in the region has led to a number of territorial disputes, including between Libya and Chad over the Aouzou Strip; Egypt and Sudan over the Hala'ib Triangle; and Morocco and Algeria, both over their common border and over the status of Western Sahara. The latter is a perennial source of tension between Morocco and Algeria that remains a major obstacle to regional integration and cooperation. Tense bilateral relationships could deteriorate further in the face of climate change-induced dislocations. Frictions over a number of issues, from the activities of Islamist militant groups to illegal immigration flows, could lead to a variety of aggressive measures including economic sanctions and even war. Although civil conflicts are more likely than interstate conflicts, internal disputes have historically not spilled over into neighboring countries. The Algerian civil war lasted two decades without major impacts on its neighbors and Western Sahara has endured 35 years of civil war without major impacts except insofar as neighboring states exploit the conflict. Nevertheless, future internal conflicts might not be as contained as in the past due to the trans-border aspects of climate change, such as migration.

The Sahara and the Sahel. There is greater potential for climate change-induced conflict in the Sahel and Sahara than between the states in North Africa. The states of the Sahel have far fewer resources and may face more severe climate change-induced challenges that exacerbate existing crises. The risks of state failure or serious civil or cross-border conflict are high. The conflict in Darfur provides an example of what environmentally driven conflict in the Sahel might look like. Mali, Niger, Chad, and even northern Nigeria are likely theaters for climate change-induced conflict. Such conflict could easily spill over the extremely porous borders into North Africa's Saharan south, following the flow of refugees. The nomadic tribes such as the Tuareg that inhabit the North African-Sahel boundary do not recognize international borders. Cross-border smuggling, human trafficking, and other illegal activity are likely to increase with greater migration and climatic stress. The Sahara-Sahel corridor is also likely to host an increased jihadist presence, further threatening North African and global security. The North African states could be drawn into interventions to secure their southern borders or opportunistically expand their influence in a chaotic Sahel. The example of Libya's wars in Chad illustrates how such adventurism could become a quagmire.

The Nile. Conflict between Egypt and its southern neighbors over the waters of the Nile constitutes the most serious risk of major interstate conflict in the region over the next

two decades. Ensuring access to Nile waters is a fundamental national security priority for Egypt, driving Cairo's focus to the south rather than toward its western Maghreb neighbors. Although Egypt received the lion's share of Nile water in the 1954 Nile Waters Agreement, it has nevertheless used and needed far more than its allotted share. This perennial source of friction with Sudan, Ethiopia, Uganda, and other upstream states will worsen if climate change significantly reduces precipitation in the East African Highlands. Any upstream efforts to divert more water from the Nile would pose a grave threat to Egypt, which Cairo is prepared to deal with forcibly. For example, realization of Ethiopia's longstanding plans to dam the Blue Nile would likely provoke Egyptian air strikes. Egypt's position restrains both climate change mitigation and development options across a large swath of East Africa, particularly Sudan, which may suffer severe climatic impacts. Water wars between Egypt and Sudan are a significant risk in the next two decades. The probable independence of South Sudan after the 2011 referendum will further complicate control of the Nile.

Overall Foreign Policy Implications

Foreign policy interests in North Africa are first and foremost a function of how such interests can protect and promote the power and privileges of the narrowly based ruling elite. As such, foreign policy considerations are pursued in a very instrumental fashion regardless of their impact on broader societal concerns. The preeminent climate change-related foreign policy objective for North African regimes over the next two decades will be to develop relationships and access to resources that bolster regime security against climate change-induced instability. North African states are therefore likely to adopt more open foreign policies that seek greater engagement with the United States and Europe.

Despite similar overall foreign policy goals pertaining to climate change mitigation assistance, the North African states are not likely to act as a concerted regional bloc. Each government will pursue its own foreign policy reflecting its specific interests and orientation, often in competition with its neighbors. As in other areas, the foreign policies of Egypt and of the Maghreb have differing orientations. Egypt's most important relationships are with the United States and the Middle East, while the foreign policy of the Maghreb is Euro-centric. These distinctions will most likely persist over the next two decades.

Climate Change Mitigation Assistance

Facing severe political, economic, and social dislocations, North African countries will work assiduously to win sweeping aid packages from Western donors. Foreign assistance will play a critical role in North Africa's climate change mitigation efforts over the next two decades, compensating for inadequate domestic capacity. On the other hand, without sufficient oversight, foreign aid is likely to fall prey to the same problems that dilute domestic state capacity in the region. In addition to financial aid and investment, North African states will seek Western technical expertise and technology transfers. While the Maghreb states will look primarily to Europe as a source of climate change mitigation aid, Egypt will look first to the United States. Unlike Sub-Saharan Africa, North African states are less engaged with China on development issues.

Barring a major shift in North African elite attitudes, states in the region are likely to approach climate change mitigation aid from an opportunistic perspective. North African states will try to extract as much as they can from international donors. They may not seek the types of foreign assistance directly applicable to their most pressing climatic challenges. Instead, they are likely to push for security and economic development-oriented assistance that benefits state and elite interests rather than necessarily mitigating climatic impacts. For example, hydrocarbon-rich states such as Algeria and Libya will seek compensation for expected losses in income as oil and gas consumers come under increasing pressure to reduce their carbon footprint. They may seek financial assistance and technological expertise to develop alternative sources of energy such as solar and wind power. In addition, North African regimes will seek increased military and security assistance to enhance regime security under the guise of combating climate change-induced regional and domestic instability.

As climate change becomes more of a driver of cross-border migration, North African states will hold out the need to stem migration flows as a justification for significant increases in climate-related foreign aid. They may also demand increased access to European markets as another incentive for North Africans to stay home rather than seek economic opportunity in Europe. Because of the direct threat it poses to Europe, the migration issue could become the strongest bargaining chip for North African states. Depending on the magnitude of climate change-induced migration flows, they might resort to outright blackmail, threatening to unleash unimpeded flows of migrants unless granted massive amounts of foreign aid. In a more general sense, they may play the "climate change card," citing the threat of climate change-induced regional crisis to garner Western aid, as they have done with the "terrorism card."

The United States and North Africa

Relations between the United States and North Africa have varied widely over time and between states in the region. The strongest US relationships are with Morocco and especially Egypt. Relations with Tunisia and Algeria are also solid and improving, bolstered by cooperation against international terrorism. Although relations with Libya remain tenuous, the formerly implacable hostility has eased since Libya abandoned its WMD programs and adopted a more conciliatory policy in 2003.

Although the evolution of US relations with the North African states over the next 20 years is difficult to predict, the challenge of climate change will likely encourage increased engagement. To the extent that US relations with all five North African states continue to improve, the United States could act as a facilitator for greater regional cooperation. For the Maghreb states, relations with the United States will most likely continue to be secondary to their relations with Europe. States in the region may attempt to leverage competition for regional influence between the United States and Europe, particularly France. Conversely, Egypt is a close ally of the United States with weaker ties to Europe. The US stake in Egypt is much greater than in any other country in the region; climate change-induced crises in Egypt would impact US interests far more than climate change in the Maghreb. Ultimately, the differing relationships may encourage a division of labor whereby Europe concentrates on support to the Maghreb and the United States on support to Egypt.

US Interests in North Africa. Over the next two decades, climate change is likely to raise the profile of North African instability as a threat to US global interests. The principal US interests at stake in the Maghreb are terrorism, energy, and the region's potential to destabilize Europe. The Maghreb and the Sahara-Sahel corridor constitute a fertile ground for terrorist activity, and climate change is likely to significantly exacerbate the threat. Ties with North African populations in Europe increase the potential for militants in the Maghreb to threaten key US allies, a factor also likely to worsen due to increased migration. Although North African energy exports to the United States have become more important in recent years, the region is more significant in terms of the energy security of US allies in Europe. The Maghreb has the potential not only to export instability to Europe but to absorb a significant share of European attention and resources. An unstable Maghreb could therefore make Europe a less reliable and capable ally for the United States. The principal US interests in Egypt concern security in the Middle East as opposed to Europe. Egypt is a major US ally in the region and a leader in the Arab world, playing a crucial role on the Israeli-Palestinian issue and the struggle against Islamic extremism.

Security Relationships. Security issues are the primary focus of US relations with North African states. The predominance of security and military concerns has led to disproportionate US engagement with security apparatuses in the region, strengthening regimes in ways that may damage long-term prospects to meet the challenges of climate change. US policy in the region has become even more security-centric as a result of the continuing struggle against radical Islamic terrorism. While terrorism has deepened US security ties with states in the region, it has also narrowed the scope of US engagement, which may not be in the long-term interests of either party. As with their bilateral relations with Europe, North African states view security cooperation with the United States in terms of regional rivalries.

North Africa's governing elites have been more than willing to exploit the US preoccupation with security issues in the region to acquire both military equipment and intelligence information to advance their own security interests. To secure greater US support, regimes often portray threats that are more criminal, such as cross-border activities by Saharan nomads, as terrorist-related. They may similarly redefine climate change-related unrest and opposition activity as terrorism, particularly due to the probable prominent role of Islamist organizations. The United States needs to be wary of enabling state repression of actors who might have a constructive impact on climatic challenges and sociopolitical reform. Conversely, the United States may be able to exploit North African states' need for greater security assistance due to climate change-induced instability to increase military access and cooperation. Faced with greater security challenges, states in the region may be more welcoming of United States African Command (AFRICOM) and more open to US military operations in North Africa. Such access could become critical if jihadists gain a greater foothold in the region.

US Climate Change Mitigation Assistance. The most important contribution the United States can make to North African climate change mitigation probably is the provision of technical expertise. Promoting more informed, efficient, and effective decision-making on infrastructure, resource allocation, and development planning will act as a force

multiplier for both financial aid and domestic regional capacity. In addition to direct climate change mitigation assistance, overall increases in development assistance and investment will boost regional adaptive capacity. In the longer term, promoting North African economic development is a more effective means of providing the resources needed to address climate change than simply continuing foreign aid. Bolstering the region's economies will spur infrastructure development and job creation, directly addressing climate change-induced unemployment and other deleterious impacts. At the same time, the United States could incentivize more sustainable development patterns suited to the constraints climate change will impose on the region. The United States can provide development advice and assistance in a wide range of critical areas, ranging from health to agriculture.

In most respects, US assistance will most likely parallel that from Europe—a mix of foreign aid packages, investment, and technical assistance. There are a number of areas, however, in which the United States has comparative advantages relative to Europe in the kinds of assistance it can provide. The region's most critical needs in terms of climate change mitigation assistance are in water resource management. The inefficiency of existing water management infrastructure is a major contributor to the region's vulnerability to climate change. The United States, far more so than Europe, has long experience dealing with water resource issues that could be shared with North African countries. The American Southwest is hydrologically comparable to North Africa and could provide an instructive model for water resource management and irrigation policies in both the Maghreb and Egypt. In addition, unlike Europe, the United States can offer North Africa genetically modified crops that could dramatically improve agricultural adaptive capacity. The downside is that European restrictions on such crops would close European markets to North African exports. On the other hand, introduction of genetically modified crops could significantly mitigate domestic food security issues in the region.

Although efforts to raise awareness of climate change, engage with civil society, and promote political and social reforms also could produce beneficial results, the effectiveness of such efforts will be determined by how sensitive they are to the sociopolitical realities of the region. North African states are adept at circumventing Western political pressures involving human rights abuses, democracy promotion, and other liberalizing measures in civil society. They are hostile to intrusions into their internal affairs, particularly the delicate issue of state-society relations. The United States should not expect North African states to subordinate regime security and elite self-interest to climate change mitigation. There could be a backlash from states in the region that could damage mitigation efforts and relations with the United States as a whole. For example, public relations campaigns to raise climate change awareness could easily be perceived as critical of local regimes for their inaction and ineffective responses and of elites for contributing to unsustainable development. Similarly, empowering NGOs and civil actors and promoting other forms of social mobilization could be viewed as threatening by North African regimes even if directed at mitigating climatic challenges.

The Copenhagen Negotiations

North Africa is unlikely to play a substantive role in the Copenhagen climate change negotiations. The region is not a significant global source of greenhouse gas emissions

and has more to gain from engagement with Europe on the climate issue than from a global agreement. In general, North African states are likely to go along with the overall position adopted by the G-77. In addition, Libya and Algeria can be expected to push for compensation for prospective losses in hydrocarbon revenues under a more stringent emissions regime.

This paper does not represent US Government views.

CONFERENCE REPORT

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