

Climate change and security in North Africa

Focus on Algeria, Morocco
and Tunisia

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Introduction

This research paper takes a regional perspective and looks at the cascading climate risks for three countries in North Africa, namely Algeria, Morocco and Tunisia, also known as the Maghreb.¹ This region presents a particular challenge with regards to transboundary or – cascading – climate risks, particularly given its high levels of water stress (and the importance of water in several key sectors and systems in the region) and the prediction that the region is bound to become hotter and drier in the future (IEP 2020).

Cascading climate risks, or transboundary climate risks, are climate risks that cross national and sectoral borders. This means not only that climate change has impacts across boundaries, but also includes the notion of the transboundary or cascading effects of adaptation – positive or negative. Positive or negative adaptation strategies, taken by one or more countries have repercussions for other countries (Hilden et al. 2020).²

There is a growing body of both qualitative and quantitative analysis on the impact of climate change and how this impacts development and security dynamics in Sub-Saharan Africa, for example the extent to which climate change has affected violent conflict between pastoralists and herders. But qualitative studies on cascading climate risks, in particular focusing on North Africa are scarcer (Ide et al. 2020).

This policy brief has two central objectives. First, it aims to better understand the climate-related security risks for North Africa, with a focus on water, rural livelihoods and inequality, and the risk of incoherence between climate and other policies; Second, it aims to better understand the level of North Africa's adaptive capacity, by taking a closer look at three climate-related development and security risks, notably:

- 1. Decreasing natural resources:** A first strand of climate-related security risks is related to the management and allocation of resources in a context of growing demand due to a population and economic growth. This includes the use and allocation of water resources (e.g. groundwater from aquifers) but also land rights in the case of dam construction, intended to be built to remedy the declining levels of groundwater. The decrease in water, and potential mismanagement of water resources risks leading to growing tensions and inter-communal conflict.
- 2. Rising inequalities:** A second strand of climate-related security risks is the risk of rising inequalities in a context of existing socio-economic grievances and protests. High levels of rural-urban migration as a result of diminishing rural livelihoods, low spending in rural areas and growing disparities, will present additional challenges for the region. The position of women remains undervalued. Thus far, the link between climate changes and criminal or violent extremist activity is not apparent, but lack of livelihood opportunities presents a risk factor (in particular for men).

¹ Egypt merits a separate analysis given the presence of the Nile, which presents a separate set of regional security and climate-related implications which are not relevant to the same extent for Morocco, Tunisia and Algeria. Libya was left out given the different conflict setting, but both countries will however be addressed as part of the CASCADES project.

² See also: <https://adaptationwithoutborders.org/>.

3. **Policy incoherence:** A third possible form of climate-reduced security risks are related to the unintended (negative) consequences of climate change policies in North Africa, as a result of incoherences and contradictions in these policies. This is notably the case with regards to the energy transition from fossil fuels to renewable energy, which has implications for the use of resources such as water and land, and poses questions related to employment.

This brief is organised as follows:

- **Section 1** explains the methodology and conceptual framework for understanding cascading climate risks and the conceptual link between climate change and security.
- **Section 2** provides a climate and conflict vulnerability assessment of North Africa.
- **Section 3** presents three strands of possible climate-related security (and development) risks.
- **Section 4** looks at what our analysis will mean for developing possible future scenarios for climate adaptation in North Africa.
- **Section 5** the closing section, provides preliminary thoughts on the implications of cascading climate impacts in North Africa for Europe from a policy coherence standpoint of view. The last two sections will form the basis of forthcoming policy briefs on future climate scenarios and policy implications for Europe.

This research paper is part of a series of papers on the topic of “climate change and foreign policy in North Africa”, published in the framework of the Cascading climate risks: Towards adaptive and resilient European societies (CASCADES) project (2019-2023), funded through the European Commission’s Horizon 2020 programme.³

This paper is published in close conjunction with a research paper by ECDPM’s Hanne Knaepen on climate adaptation challenges in the Tunisian agri-food system.

³ CASCADES is an interdisciplinary project funded under Horizon 2020 (grant agreement 821010) devoted to the analysis of cross-border impacts of climate change. It applies state-of-the-art quantitative and qualitative research and stakeholder engagement approaches to identify critical areas of concern for European societies and EU policy and explore different solutions. One of the results will be actionable knowledge on cross border impacts, co-produced with and for key actors in Europe and beyond, see: www.cascades.eu.

Understanding cascading climate risks: concept and methodology

Cascading climate risks: a conceptual framework

There is a growing consensus that climate change exacerbates existing political, social, and environmental vulnerabilities. In this paper we will base our conceptual framework on two central ideas that make up the conceptual framework. The first is that climate change should not be seen as a predominantly external factor, as a “threat multiplier” that leads to ever more conflicts or risks. Instead, we look at climate change as a profound change that risks exposing vulnerabilities that are already inherent in certain socio-ecological systems (de Coning and Krampe 2020). Climate change effects on these weaknesses can lead to a multitude of ‘climate-related security and development risks’. These climate risks can manifest themselves in a broad range of sectors (foreign policy, security, development, economy, etc.)

This links to the second idea in our conceptual framework, namely that of ‘cascading climate risks’. Climate risks are the possible outcomes or consequences of climate-related hazards and change and/or adaptation response. Cascading climate risks, also known as ‘transnational or transboundary climate risks’, are climate risks which cross national borders, but also systems and sectors. These risks can be associated with (1) the transboundary impacts of climate change; and (2) the transboundary effects of adaptation - positive or negative - made by one or more countries that have repercussions for other countries. Benzie et al. (2016) coined a framework with four categories, for cross-border connectivity of climate risks: biophysical, trade, finance and people. In other words, the effects of climate change can cascade and sometimes escalate through security relations, international trade, financial markets, international aid operations as well as migration (Hilden et al. 2020). Consequently, climate change may be a factor in changing the general conditions of economic stability and structure and scope for regional and global governance, forcing individual countries to re-think their approach to adaptation at the national level, including for European countries (Hilden et al. 2020).⁴

The mechanisms of transmission for cascading climate risks across boundaries are a complex phenomenon, still being explored, and require looking at a range of environmental, economic and socio-political factors that can directly and indirectly influence vulnerabilities and resilience to these climate-related security and development risks across borders. The transmission of transboundary, cascading, climate risks are central in the key objective of CASCADES, which aims to contribute to the understanding of the cascading impacts of climate change across trade, foreign policy and security, trade and finance, and what this means for European policy (coherence) when addressing climate change adaptation.⁵

⁴ See Figure 2 in Hilden et al. 2020 for a visualisation of how the multiple ways in which climate impacts elsewhere could become risks for Europe.

⁵ See: <https://www.cascades.eu/>.

Linking climate change to conflict: climate-related security risks

Based on analysis of existing research on conflict and climate change, we identify five main ways through which climate-related security and development risks can lead to conflict: (1) growing competitions over (scarce) resources, (2) rising inequalities and undermining livelihoods, (3) possible manipulation by (armed) opposition or violent (extremist) groups, (4) the impact of climate change on food prices and food supplies and (5) the 'unintended impacts' of incoherent (climate) policies (Detges et al. 2020, Rüttinger et al. 2015, Brown 2020).

First, climate change can hamper access to and availability of natural resources, which can lead to tensions and increased competition. Recent research on the Central Sahel shows that conflict increased, not just as a result of increased competition over (more) water wells, but as a result of the breakdown of effective mechanisms to peacefully mediate between communities, notably pastoralists and herders (Crisis Group 2020a).

Second, climate change can lead to livelihood insecurity, and to search for other livelihoods. Droughts in Tunisia and Morocco are expected to lead to increased droughts, and reduce agricultural productivity as well as reduce water levels in surface waters. This could lead to reduced income for farmers and agribusinesses, increased food prices and rural unemployment (Verner et al. 2018a, 2018b). Climate change is also expected to lead to rising sea levels and coastal degradation in North Africa, expected to have a detrimental effect on critical infrastructure, as well as housing and tourist infrastructure and lead to unemployment and outmigration (USAID 2018). Resilience strategies can include migration and seeking alternative livelihoods, often putting pressure on infrastructure, and in certain cases leading to violent or illegal economic activities. But the linkages are still heavily debated and intricate. For example, a 2016 study suggests that droughts in the 1970-80s in Mali led to conflict in 2000s, not because of scarcity, but as a result of the exposure of migrated young men from Mali to revolutionary ideas in Libya and Algeria, and further radicalisation as a result of political marginalisation (Brown 2020). According to Brown (2020) adopting a simplistic narrative around the impact of climate change on jihadist movements might be used to mask the responsibility of governments in creating conditions of political marginalisation and low development.

Third, research shows that violent groups can manipulate grievances that arise in the aftermath of disasters and extreme weather events, and the government's response to them. Disasters do not always lead to more conflict, and can in fact be an impetus for peaceful resolution.⁶ There is a qualitative difference between disasters and slow-onset effects of climate change, for example environmental degradation, and where the latter does not capture the sense of urgency that may be needed to overcome (political) differences.

Fourth, climate change can lead to volatile food prices and provision of food, for example caused by drought and dwindling harvests (Hendrix and Haggard 2015). This in turn can lead to high food prices, causing a particular problem for countries highly dependent on food imports and high food subsidies, especially when combined with political grievances towards governance systems or mechanisms (Mosella et al. 2019).

⁶ For example, following the tsunami in Indonesia, the peace process in Aceh received renewed attention, see TNH 2014.

This also relates to a fifth example of how climate change can lead to conflict, through the ‘unintended’ impacts of incoherent (climate) policies. The push towards green transitions can become conflictual if they include harsh social corrective measures. Or, agricultural policies aimed to strengthen employment can aggravate pressure on scarce water resources.

How countries adapt to climate-related security and development risks (and absorb these pressures) depends on vulnerabilities of existing socio-ecological systems, as well as governance structures and adaptive capacities. What these combined vulnerabilities and risks look like for North Africa, and in particular Algeria, Tunisia and Morocco are discussed in more detail below.

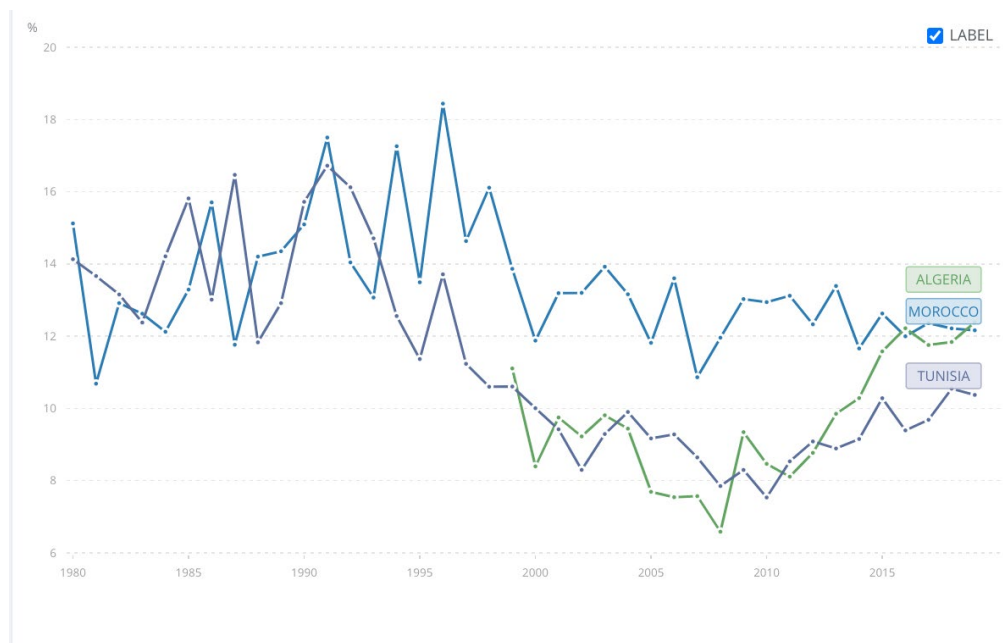
Climate risk assessment for North Africa

Snapshot of North Africa's Maghreb region

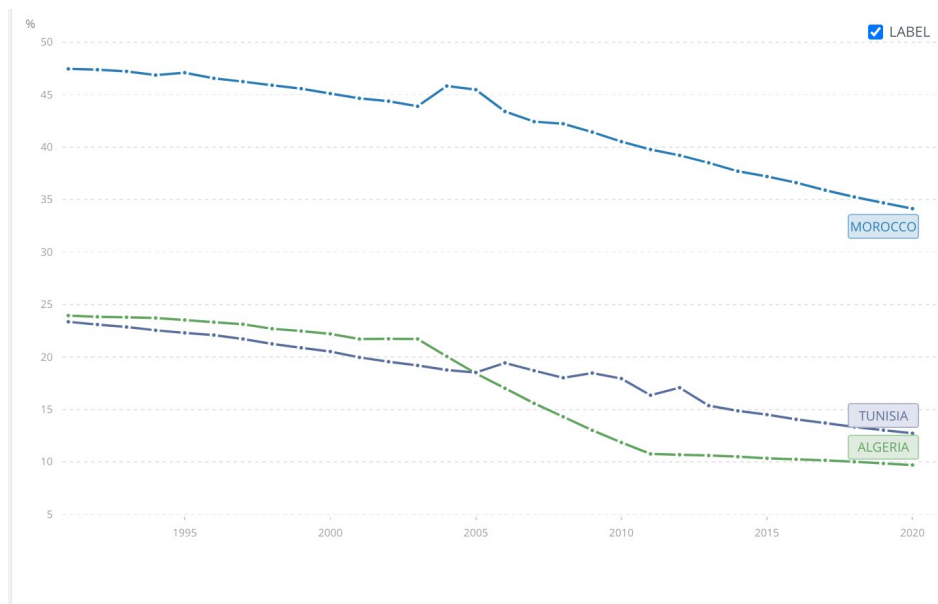
Already a dry area in the world, climate change is adding pressure to societies in Algeria, Morocco and Tunisia, home to some 91,2 million inhabitants (WB 2020b accessed January 2021). The three countries share a number of geographic features. The Atlas Mountains crosses Morocco, Northern Algeria and Tunisia, receding southwards into steppe landscape before meeting the Sahara Desert, which marks the southern regions of all three countries. Valleys in the Atlas Mountains and the Mediterranean coastal zones are the main sources of farming land in the Maghreb region.

Agriculture remains an important element of North African economies, in addition to oil and gas industries (in Algeria), tourism (mostly in Morocco and Tunisia) and manufacturing. This paper focuses on agriculture to a great extent, given the central place of water in the region's agricultural sectors, and the high pressures on water resources as a result of climate change and unsustainable use of water. Especially in Morocco and Tunisia, agriculture has expanded and developed considerably and has been a key driver of economic growth and employment in the Maghreb region (Houdret et al., 2017). In Morocco, Tunisia and Algeria, agriculture contributes 12,5, 10 and 11,8 percent respectively to the Gross Domestic Product (GDP) of these countries (WB data, see graph 1 below). Moreover, the sector is a key employer in some of the countries, employing almost 35 and 13 percent of the population in Morocco and Tunisia respectively and 9,9 percent of the population in Algeria (FAO 2020, and WB data, see graph 2).

Graph 1. Agriculture (including forestry, and fishing) (% of GDP) – Morocco, Algeria and Tunisia



Graph 2. Employment in agriculture (% of total employment) (modelled ILO estimate) – Morocco, Algeria and Tunisia



However, the economic relevance of the agriculture sector is even greater when accounting for the high levels of employment in certain rural areas (up to 80 percent of the population) and widespread ‘informal’ wage labour (Houdret et al. 2017). However, water and fertile land are scarce in these countries and competition over their control is therefore high. As Houdret et al. (2017) show, this has led to a strong politicization of resource access and allocation, especially in the case of irrigated agriculture, where historically local power structures have monopolised control of resources. At the same time, the region is marked by a high and growing dependence on international markets for key staple food products (OECD/FAO 2018) making it vulnerable for food price fluctuations, including as a result of harvest failures due to climate change and extreme weather events in grain exporting countries (Hilden et al. 2020).

The region has witnessed enormous social changes in the past decade, notably since the start of the Arab Revolts. A decade following the eruption of street protests in Tunisia, followed by other Northern African and Arab countries, several leadership changes took place. Tunisia as one of the only countries in the region saw a regime change and a move towards greater democratic governance (CFR 2020), but with serious ongoing challenges with regards to income inequalities and corruption. In Morocco and Algeria, protests have also taken place since 2011, notably in the Rif in Morocco in 2016-2017 and Algeria since 2019.

Compared to Tunisia, the changes as a result of these popular protests that have taken place throughout the last decade have resulted in some leadership changes in Morocco and Algeria, while the ruling political elites and regimes by and large have stayed in place. (Interview, January 2021) Following popular protests in Morocco, King Mohammed VI of Morocco promised significant democratic reforms. The ensuing reforms in Morocco shifted some authority over government from the monarchy to the elected legislature. But the constitutional revision process needed for this was deemed flawed and heavily dominated by King Mohammed VI (Madani et al. 2013). King Mohammed VI maintains substantial power through a combination of formal powers

and informal lines of influence.⁷ Since 2011, continued socio-economic difficulties and development failures, together with human rights abuses, have led to recurrent protests and strikes, notably the mass protests in the Rif during 2016-2017, known as the Hirak Rif (Interview January 2021). In Algeria, no leadership change took place in the wake of the Arab Spring, but popular protests referred to as the Hirak, ousted President Bouteflika, who had been in power since 1999, in April 2019 (Crisis Group 2019). While there are several opposition parties, political affairs are seen as dominated by a closed elite based in the ruling parties, the National Liberation Front together with the National Democratic Rally, and the military.⁸ Former prime minister Abdelmadjid Tebboune was elected as the new president in December 2019. But election turnout was low and the legitimacy of the elections was widely contested by activists in Algeria. (Interview, January 2021) Following his election, some analysts noted a period of “relative détente” between the wider Hirak (Arabic for ‘movement’) and the governments (Crisis Group 2020b). But Hirak activists continue to question the legitimacy and transparency of the elections and have continued to organise peaceful protests, albeit with smaller numbers, up until March 2020, before the government imposed movement restrictions due to the COVID-19 pandemic. Recently, President Tebboune’s lengthy hospitalisation in Germany has recalled the Bouteflika era for many Algerians, and has further delayed urgent political and economic reform, already delayed as a result of the Corona pandemic (Interview January 2021).

According to Woertz (2017), the political economy of food and agriculture was also an important element in the Arab Revolts which began around 2010. A range of neo-liberal adjustment policies were implemented in the preceding decades by bureaucratic-authoritarian reform coalitions (in Morocco and Tunisia), largely favouring urban constituencies and the economic interests of military–security networks (in Algeria), and disenfranchising rural constituencies. As a result, rural impoverishment and rural flight were seen as a factor contributing to urban unrest and protests, which, in the case of Tunisia started in disadvantaged rural towns, and not in the major urban agglomerations.⁹ According to Lazard (2020), the environmental factors of the Arab Revolts have remained largely under-examined. She notes that increasing temperatures, unreliable rainfall, extreme drought, monoculture agriculture, market failures and speculation over staple goods were some of the key drivers behind the protests of the Arab Spring in 2011, in a context of growing social disenfranchisement.

At the same time, the region faces high levels of ecological threat, in particular water stress (IEP 2020). North Africa is already prone to frequent droughts and faces future water shortages due to unsustainable withdrawal of groundwater. In addition, mean temperatures over the past century have risen by 0.5°C, and precipitation over the past several decades has decreased by up to 10% in some parts of North Africa (OECD/FAO 2018). While these climate change effects are significant, the Intergovernmental Panel on Climate Change (IPCC) expects their impact to be more modest when compared with other drivers of increased water demand, such as growing populations, growing urbanisation and the expansion of the agricultural sector (Brown 2020). In combination with the increasing degradation and overuse of water and land, this is reinforcing competition, politicization and rent-seeking behaviour of elites, with water-intensive and export-oriented cash crops placing increasing demands on the local ecosystem (Houdret 2017).

⁷ Freedom House, [Morocco](#), accessed December 2020.

⁸ Freedom House, [Algeria](#), accessed December 2020.

⁹ The current context of Tunisia is highlighted in more detail in the twin paper to this publication, by Hanne Knaepen (forthcoming February 2021).

This is only expected to become worse, with expectations that the region will become hotter and drier as a result of climate change (OECD/FAO 2018). The expected climate change impacts and conflict assessment of North Africa are discussed in more detail in the following sections.

Climate and conflict vulnerability assessment

A well-known framework is the Intergovernmental Panel on Climate Change (IPCC) vulnerability assessment, which looks at hazards, exposure and vulnerability as well as adaptive and coping capacities (Cardona et al. 2012). According to the IPCC (2007)¹⁰, “Vulnerability to climate change is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. [It] is a function of the character, magnitude and rate of climate change and the variation to which a system is exposed, its sensitivity and its adaptive capacity.” This has been adapted, for example by Schilling et al. (2020) to look at the risk for water-related conflicts in Northern Africa.

Much research focuses on the effect of extreme weather events or disasters on conflict. For example, recent research looks at a number of factors which could contribute to a higher likelihood of conflict following (natural) disasters. These include: (1) large populations, (2) the political exclusion of ethnic groups and (3) relatively low levels of economic development (Ide, 2020). But while extreme weather events are expected to increase in the coming decades, climate change is a relatively slow-onset phenomenon, slowly affecting resources such as water and land (UNFCCC, 2018). Other research (for example Koubi 2019) finds that a combination of factors linking the likelihood of climate change to conflict: regions dependent on agriculture, in combination with low levels of development and political marginalisation.

Clearly, how and when we can expect climate-change related security risks requires a complex understanding of how climate change impacts interact with governance mechanisms and adaptive capacities, in a given context and time. In this briefing note, we develop a vulnerability assessment using climatological data to assess the exposure to climate change, and complement it with data from ecological risk and conflict datasets, notably the 2020 Ecological Threat Register (ETR) by the Institute for Economics and Peace (IEP).¹¹ The ETR also includes a Positive Peace framework to measure socio-economic resilience to ecological threats, and to identify where resilience is unlikely to be strong enough to adapt or cope with these future climate shocks.¹² In this framework, low levels of positive peace mean low levels of adaptive capacity or resilience. Results are summarised in Table 1 below.

¹⁰ Some technical innovations have been made to the vulnerability assessment framework as conducted by the IPCC. See Hanne Knaepen (forthcoming) for a more elaborate discussion.

¹¹ The ETR is a multi-indicator composite register of risk which represents the number of threats a country faces. The ecological threats included in the ETR are water stress, food insecurity, droughts, floods, cyclones, temperature rise, sea level rise and population growth (IEP 2020c).

¹² The IEP’s Positive Peace framework considers eight pillars for climate resilience: Well-functioning government; Sound business environment; Equitable distribution of resources; Acceptance of the rights of others; Good relations with neighbours; Free flow of information; High levels of human Capital; and Low levels of corruption.

Table 1. Climate and conflict vulnerability assessment in North Africa

	Morocco	Algeria	Tunisia
Climate change effects ¹³			
Expected climate change effects	Rainfall		
	<ul style="list-style-type: none"> ■ Increased rainfall variability and a reduction in rainfall is likely over North Africa by the 2100 with significant differences in northern and southern regions of North Africa. ■ Changes in atmospheric pressures over the North Atlantic zone and the Inter-Tropical Convergence Zone could potentially produce less rain in northern parts of North Africa, while increasing moisture delivery to southern parts of the region, creating a North-South dipole. 		
	Temperatures		
	<ul style="list-style-type: none"> ■ Both minimum and maximum temperatures are likely to increase under medium emission scenarios of a 2°C global temperature, but land temperatures are expected to rise faster than the global average. ■ Strongest warming is projected to take place close to the Mediterranean coast and in inland Algeria. 		
Expected climate change effects	Droughts		
	<ul style="list-style-type: none"> ■ Projections for drought and desertification are unclear, but various studies expect an increase in extreme (more severe and intense) drought conditions around the Mediterranean and Northern Africa ■ Morocco, Algeria, and Tunisia are consistently projected to become global hotspots for drought by the end of the 21st century, given the combination of increasing temperatures and decreasing rainfall. 		
	As a result of these climate change effects, several extreme weather events and hazards are expected in North Africa notably, dust and sand storms (with serious health implications), sea level rise and flooding, and heatwaves		
	Exposure to climate risk according to Ecological Threat Register (ETR)(IEP 2020)	Medium exposure (score 3 out of 8)	Medium exposure (score 2 out of 8)
Positive Peace Index 2020 (IEP 2020)	Medium	Low	High
Global Peace Index rank (IEP 2020b)	83 out of 163	117 of 163	92 out of 163

¹³ Price 2017, Verner et al. 2018a & 2018b, Brown 2020 and <https://climateknowledgeportal.worldbank.org/>.

Climate effects and ecological threats

In terms of climate impacts, three main climate change impacts can be identified for North Africa that are closely interconnected: increasing temperatures, rainfall variation and increasing droughts. The decreasing availability of (ground)water (as a result of decreasing rainfall and groundwater depletion due to overuse and mismanagement) features as one of the weakest links in North Africa's climate-related risk analysis. According to the Ecological Threat Register (IEP 2020), the number of recorded water-related conflict and violent incidents increased by 270 percent worldwide over the past decade. For North Africa (and the Middle East) in particular, water stress poses the greatest risk with 18 out of the 20 countries in this region experiencing high levels of water stress which are likely to worsen over the next two decades (IEP 2020).

According to Schilling et al. (2020), temperature and precipitation are the region's most important climate variables, given the potential impact of these, together with droughts, on water and agriculture as the main livelihood resources in the region. Increased rainfall variation is expected to lead to increased drought and decreasing water availability in all three focus countries, especially given the existing overexploitation of groundwater. Agriculture and food production in North Africa are heavily rain-dependent, including for wheat, a major staple food. In the past years, agricultural sectors have benefited from capital investment, including in irrigation systems, leading to increased productivity. However, agricultural sectors remain heavily water-intensive, with its focus on export-oriented crops, such as olives, citrus and dates.¹⁴ Water is further intensely used in the tourism sector, industry, and in some cases renewable energy plants (e.g. solar power plants) (Alboghday and El-Hendawy 2016).

North African countries are expected to face increasing temperatures as well as heatwaves. This will have an impact on energy demand for cooling, but also on agricultural production and productivity. According to research focusing on the wider MENA region, a 1% increase in temperature in the winter results in a 1.12% decrease in agricultural production (Alboghday and El-Hendawy 2016). Deteriorating rural livelihoods, as a result of declining agricultural productivity is expected to contribute to further migration flows, often to urban areas as already observed by Waha et al. (2017).

Further, according to Waha et al. (2017), the region is doubly challenged by both rising food and water demand given its projected increase in population that may double by 2070. Even if the population growth rate is slowing down in North Africa in recent years (following a steep rise around 2010s), it is still higher than global averages. North Africa's population is young, with a median age of 25 years (compared to 43 years in Europe¹⁵ but older than Sub-Saharan Africa, where the median age is 18). At the same time, North Africa is faced with a high urbanisation rate. North Africa is Africa's most urbanized region (OECD/SWAC 2020) and the average % of population living in urban areas for Morocco, Algeria and Tunisia is 68%. (WB 2020) This growing and increasingly urban population will put considerable pressures on demands for housing, cooling, food security but also employment and government service delivery, especially in urban areas.

¹⁴ See forthcoming paper by Hanne Knaepen on climate-related development risk in Tunisia (forthcoming, February 2021).

¹⁵ [Median age over 43 years in the EU - Products Eurostat News.](#)

But North Africa, including Tunisia, Morocco and Algeria are also dependent on food imports, including from Europe. This is a critical factor in assessing the transboundary climate risks of a country according to Benzie et al. (2016), often measured through the cereal import dependency ratio. The assumption is that the “more dependent a country is on food imports from abroad, the more exposed it is to climate-related disruptions in the availability, price or quality of food products.” In this framework, cereal import is taken as a proxy for measuring food imports. (Benzie et al. 2016)

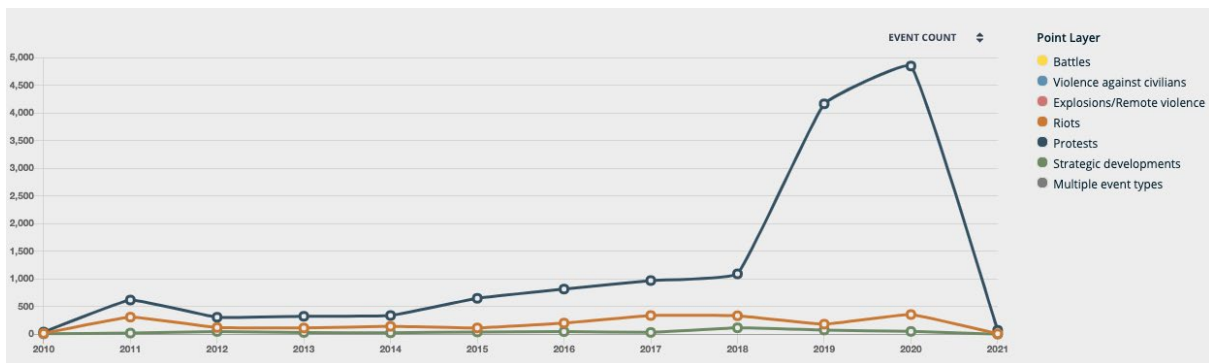
As a result, “the region's already substantial [food] import dependency could increase and thus its vulnerability to agricultural impacts well beyond its country borders”. (Waha et al. 2017) Finally, droughts in other parts of the world could impact global food prices, creating additional sensitivities for important-dependent North African countries (see below).

Climate and conflict risk in North Africa

The conflict context in North Africa, in particular Tunisia, Morocco and Algeria is marked by overall low-level (mostly non-violent) conflict, with some history of violent conflict, including civil war, terrorist attacks and regional disputes. For instance, Algeria and Morocco's roles in the Western Sahara conflict and Morocco's continued claims to the territory is a thorny example of the sour relations between the two countries. Tensions between both countries continue as they strive for regional leadership.

Terrorism and extremism have been present since the early 2000s the Maghreb region, but overall in a localized and contained way. On a national level, Algeria witnessed a ‘black decade’ including terrorist attacks in the 1990s in the context of the Algerian civil war from 1991-2002. Terrorist attacks also took place in Djerba, Tunisia in 2002, and in 2007 in Casablanca, Morocco (CSIS 2010) – but overall the region has seen fewer terrorist attacks in recent years compared to Europe. On paper, North Africa was a relatively stable region in Africa up until the Arab Revolts and popular protests that ensued, in terms of its progression in human development (levels of poverty, education and health).

However, the ongoing Arab Revolts have pointed to serious challenges with regards to democratic freedoms, civil liberties, corruption, and socio-economic inequalities. Since 2011, the region-wide protests brought about profound changes while also leading to ongoing frustration given the slow progress of economic and political reforms. Since 2010, Tunisia has continued to witness both violent and nonviolent protests by civil society actors and opposition groups against the government revolving around socio-economic issues. Similarly, since 2011, both Morocco and Algeria have faced crises in the form of large-scale popular protests by opposition groups against their respective governments over the orientation of their political systems. Data collected by ACLED shows that since 2011, popular protest generally have been on the rise, with a steeper increase since 2014, and again since 2018/2019 (see graph 3 below). In several instances, these protests have been fuelled by a mix of socio-economic and environmental concerns, and a sense of political marginalisation by central governments, including the protests against (drinking) water scarcity in Tunisia and Morocco, and protests against shale fracking in Algeria (see below).

Graph 3. Protests since 2011, numbers combined for Algeria, Morocco and Tunisia

Analysing less intense conflicts is important, and fills a gap in existing research around environmental security, climate change and conflict (Ide et al., 2020). Low-level conflicts, as Ide et al. (2020) note, can be drivers of social change, a starting point for violent escalation or an indicator for legitimate grievances. This is particularly relevant for North Africa, where researchers have pointed to the existence of political cleavages and grievances.

As mentioned above, water is a weak link in North Africa's sensitivity to climate change. Existing research for Sub-Saharan Africa shows that rainfall patterns which significantly and negatively deviate from historical norms are associated with higher risk of communal conflict, especially when these regions affected are inhabited by politically excluded ethno-political groups (de Coning and Krampe 2020). Other research has shown that regions with more difficult access to groundwater witness higher levels of communal violence (Döring 2019). Based on this data and existing literature of climate relates security risks, we identify three main ways in which climate change effects could lead to climate-related security risks (and more specifically political instability) in North Africa. These are discussed in the following section.

Cascading climate risks in North Africa

Based on the climate risk assessment developed in section 2, we see three main strands of potential climate-related development and security risks in the region, namely: (1) decreasing availability over natural resources, (2) rising inequalities and undermining livelihoods, and (3) the ‘unintended impacts’ of incoherent (climate) policies. In all three main climate change impacts, water features strongly, as do issues of food security, livelihoods and energy transition and consumption. These three key impacts do not exclude other potential impacts, nor do they operate separately from each other.

Decreasing availability of natural resources, in particular water

A first strand of climate-related security risks is related to the management and allocation of resources in a context of growing demand due to a population and economic growth. This includes the use and allocation of water resources (e.g. groundwater from aquifers) and risks leading to growing tensions and inter-communal conflict.

Climate change and climate variability are expected to lead to more severe droughts in all three countries, with some differences between regions. More frequent and intense droughts are also associated with rising global temperatures and greater rainfall variability, as well as other extreme weather-related events, such as flash floods, wildfires and other hazards. As a result of increasingly frequent and intense droughts in North Africa, surface water may not meet farmers irrigation needs, and lead to increasing reliance on groundwater, intensifying already high pressure on groundwater and aquifers (Verner et al. 2018a). Notwithstanding climate change, groundwater levels have been declining in several parts of North Africa. Aquifers in the region have been affected mostly by human activities rather than climate change, as a result of overexploitation in the last 50 years. This has also led to a degradation of water quality in many of these aquifers, leading to problems with access to safe drinking water for certain regions. Given the role that (rural) women and girls often play in the provision of (drinking) water for households, it creates a particular burden for them (Ben Fadhl, 2018). The overexploitation of groundwater resources has been caused by the growing agricultural demand, together with the growing demand in coastal urban areas with high population densities (Schilling et al. 2020). In the past decades, this situation has been intensified by a longer period of droughts and rainfall.

Tensions over the allocation of water

In dry regions, questions over the use of water and land have immediate impacts on income and livelihoods and are therefore often highly sensitive topics that concern political power (Houdret 2012). Questions over land and water use have led to growing tensions between political elites and small-scale farmers. For example, research on the overuse of water resources in Southern Morocco’s Souss Valley shows that conflicts over the allocation of (drinking) water are connected to the overexploitation of groundwater for the production of certain crops, notably citrus fruits. In the Souss Valley, the overuse of water is causing sinking levels of aquifers and the abandonment of agricultural land.

At the same time, irrigated agriculture, often focused on export-oriented fruits, is still expanding. According to Houdret (2012), “This export-oriented agriculture mostly benefits the economic elite, increasing their political influence. Small farmers, on the other hand, face growing threats to their livelihoods.”

Tensions over water, either for drinking or irrigation, but also in cases where water was used to supply economic activity such as mines or solar plant cooling, has led to so-called ‘thirst protests’ in Morocco, Algeria and Tunisia.¹⁶ Examples include the barricading of Ain Defla (Algeria) in 2003 by its residents, blocking access to the union and its associates, and demanding better transport, water and education.¹⁷ In 2017, protests over shortages of drinking water turned violent in Zagora, Morocco.¹⁸ Also in Morocco, the construction of the Ouarzazate solar power plant has led to conflicts over land, where land was re-appropriated without the consent of local communities (Hamouchene 2020). In several places across North Africa, the competition for arable land and water between agribusiness and small-scale farmers has been further intensified by mining, for example in the case of the expansion of the phosphate industry (see box 1 below).

Box 1. Phosphate extraction and environmental degradation in central Tunisia

In central Tunisia, the Tunisian government has tolerated illegal drilling by the phosphate industry for several decades. Combined with a boost of export-oriented date production by large agribusiness this has reinforced the marginalization of small farmers in the region. In several places, small farmers have been forced to resort to pumped irrigation. As a result of these processes, two of the largest groundwater bodies in the region (the Gabes-South table and the El Hamma-Chenchou table) are intensely exploited (Rousselin 2018). Furthermore, the dumping of phosphoric acid and chemical fertilizer by production plants on Tunisia’s shores and at sea have led to declining fish stocks and affected local fishing communities (Rousselin 2018). Both the central interior region of Tunisia, home to phosphate extraction, and the coastal regions for phosphate transformation remain marked by high levels of unemployment and environmental degradation with low levels of provision of public services and infrastructure. Protests have erupted several times in the past years, with protesters demanding jobs and a share in mining revenues (Amara 2017).

Plans to secure water access face obstacles

The pressures on water for agriculture (including irrigation), mining and other sectors such as tourism are further aggravated by decreasing availability of water in dams. This is due to higher evaporation of surface water as a result of higher temperatures, but also siltation and declines in surface run-off. This can lead to further problems, for example when the warming of surface water reduces their ability to biodegrade certain pollutants resulting in a decrease in water quality (Mohammed and Al-Amin 2018). At the same time, dam building is proposed as part of the solution to increase water availability. This is for example the case in Morocco, where the government is planning to build three dams with a total capacity of 367 million cubic meters around Marrakech, in central Morocco, as part of the National Drinking Water Supply and Irrigation Program worth €10.8 billion (The North Africa Post 2020). The government is also working to build wastewater treatment plants, desalination plants, and a “water route” that will cost

¹⁶ <http://www.worldwater.org/conflict/map/>.

¹⁷ *Ibid.*

¹⁸ *Ibid.*

nearly \$3.6 billion aims to transfer 850 million cubic meters of water per year from the north of Morocco to the south (Zaireg 2017). In Tunisia, the government is also planning to look at dams to manage the decreasing levels of surface water, as part of its 2030 Water Strategy to further invest in storage capacity by replacing some existing dams (Verner et al. 2018a). These plans, while responding to an acute problem with water availability, have however in several instances led to conflicts over the allocation of the water gained through such projects. Research by Houdret (2012) in Morocco has shown that selecting the 'beneficiaries' of water gained through dam and irrigation schemes have been highly contentious, favouring commercial farmers owning larger plots of land, or involving harassment and breaching trade agreements with small farmers, to acquire more land irrigated by the projects.

Increasingly, governments are faced with difficult decisions on when and for who to turn off water access, between demands from commercial agriculture, drinking water, industry and other sectors such as tourism. As droughts and rising temperatures are expected to increase across the region in the next decades, these questions will become more frequent, and possibly more tenuous, with implications for economic growth as well as food security. In addition, the heavy reliance on food imports, notably for cereals, renders these three countries vulnerable to potential impacts of climate change on wheat production elsewhere, notably the 'wheat belt' area in Russia (Hilden et al. 2020). As in the past, harvest failures can lead to food shortages and food price spikes. For example in Tunisia, droughts are expected to impact both agricultural exports and imports, with risk of rising food insecurity if climate effects negatively affect key rain-fed crops and staple foods, such as wheat and barley, and livestock, but also dairy (Verner et al. 2018a). Despite these vulnerabilities, demand for food and energy is growing, due to a growing population, growing urbanisation and growing economies.

Rising inequalities, social protests and diminishing (rural) livelihoods

A second strand of climate-related security risks is the risk of rising inequalities in a context of existing socio-economic grievances and protests. High levels of rural-urban migration as a result of diminishing rural livelihoods, low spending in rural areas and growing disparities, will present additional challenges for the region.

The agricultural sector remains a relatively large employer, in particular in Morocco where formal employment is at 35% and to a lesser extent in Tunisia (13%) and Algeria (10%) (WB 2020c). Agriculture is also an important sector for female employment, notably in Morocco (Najjar et al. 2017) However as mentioned above, rural informal employment rates are also high, and the informal economy in North Africa has been expanding (Gallien 2018) while the agricultural sector is weakly regulated, with overall low levels of public spending (Wenger and Abulfotuh 2019) The agricultural sector in North Africa is heavily dependent on rainfall and growth in the sector has led to overexploitation of groundwater levels. But two other important changes have led to a decline in employment in agriculture and a loss of livelihoods in rural and agricultural communities. First, agricultural production systems are geared towards export crops and markets, with a preference for large scale agricultural production over small-scale agricultural production. This is notably the case for Morocco and Tunisia (Verner et al. 2018b, and 2018a) - to a great extent stimulated through EU trade agreements (see Knaepen, 2021 forthcoming). Second, capital intensive investments have made the agricultural sector less reliant on manual labour, while at the same time economic shifts have moved the focus away from agriculture toward industrial, extractive and service

sectors (Wenger and Abulfotuh 2019). Nevertheless, the sector is water intensive and may come under increased pressure in the next few years.

Three possible development and security risks are linked to a loss in livelihoods in the agricultural sector and rural areas.

Pressures of rural-urban migration

First, there is a risk that climate pressures push untenable levels of **rural-urban migration**, and put pressures on urban climate resilience, in a climate of existing social unrest, grievances and protests. Environmental stress, together with rural-urban disparities and ongoing conflict (although less relevant for Maghreb North Africa) were found to be the main drivers for rural urban migration in the Near East and North African region (Wenger and Abulfotuh 2019). According to research on the basis of data collected for five MENA countries in 2011 (including for Algeria and Morocco) climate stress was found responsible for 10-20% of migration (Wodon et al. 2014).

Rural-urban migration as a result of diminishing livelihoods and climate change effects could put too much pressure on urban centres. Rural-urban migration can have negative and positive effects, in both rural and urban areas. Rural migration to urban areas in North Africa has led to economic growth, but has also contributed to problems of rising informal employment, the expansion of slums, challenge with waste management, and pressure on physical infrastructure and on health and education services, amongst others. At the same time, migration can be an important source of income through remittances, generate alternative livelihoods for returning migrants and their families (Wenger and Abulfotuh 2019) or increase the trade and transfer of capital and knowledge (WB 2020).

But across the region, **public spending in rural areas remains low**, with low levels of social protection. North Africa, including Tunisia and Morocco, is also marked by overall low levels of fiscal transfers to local governments and large gaps in access to public funds between the primary city/capital and other urban areas (WB 2020). Lack of social inclusion, low social protection and service delivery can be a breeding ground for social unrest. Furthermore, cities are not exempt from climate change effects, with average temperatures in North African cities expected to rise between 1.5° and 3° Celsius by 2060, with a risk of increased desertification, impacts on energy consumption for cooling, food security, sanitation and health (Buyana 2020). According to the World Bank most cities in North Africa (with some exceptions) “have underperformed as engines of national growth, job creation, and social inclusion” but reforms within cities could offer prospects for climate resilience (WB 2020). Important to note is also that protests against the negative effects of climate change on agriculture, environment and livelihoods in North Africa are not exclusive to the region’s major cities or capitals. The start of the Arab Revolts, for example in Tunisia, started in Sidi Bouzid, in Central Tunisia, while important environmental campaigns and protests against shale gas have taken place in In Salah, in Algeria’s Southern region, some 1200 km from the capital (see below).

The role and position of women in this changing environment and the impact on livelihoods merits some specific attention, in particular the role of rural women.

Women and girls play an important role in agricultural production, household provision in energy and consumption goods and natural resource management. But across the region, women are also paid less, have less access to social protection, face challenges with regards to education¹⁹ and have less access to financial means, technical

¹⁹ Notably a higher risk of school dropout and higher illiteracy rates.

information and advisory services²⁰ and assets. Female land ownership is extremely low in the region (Benabdallah et al. 2020). At the same time, women are responsible, especially in rural areas, for the collection, transport, storage and use of water and for the maintenance of sanitation facilities and hygiene education. This division of roles (and the workload it implies for women), prevents, in some cases, women from engaging in income-generating activities and can have an impact on girls' schooling (resulting in school dropout). Already, rural women and girls face challenges to education opportunities, such as a higher risk of school dropout and higher illiteracy rates.

The changes in livelihoods, income and migration patterns as a result of climate change, are having profound impacts on gender roles, and decision-making structures, in the region. For example, existing research (including on Morocco) shows how the migration of men, in combination with intensification and commercialisation of agriculture, particularly in the irrigated areas, is leading to an increased demand for labor. This labor is provided by women, mirroring a broader global trend of increased dependence on women's cheap labor in commercial agriculture (Najjar et al., 2017). This comes on top of women becoming the head of household and increased care and work responsibilities.

Still, research in Tunisia and Morocco shows that men continue to make most decisions regarding water resources management at micro to macro levels (Ben Fadhl 2018), while women continue to have less control over their income and assets (e.g. housing) (Najjar et al. 2017). At the same time, in several places across North Africa, women have played important roles in environmental campaigns and protests (which is discussed more in detail below), but also in applying their knowledge and traditional practices for natural resource management. An example in this vein are ecosystem-based adaptation (EbA) schemes, which valorise biodiversity and ecosystem services to reduce vulnerability and reinforce resilience to climate change, with specific attention to rural women and their knowledge on the use and development of natural resources (Imen and Tabel Aoul 2020). (see also section 4).

Existing grievances and ongoing social protests

Second, climate change pressures and environmental degradation are already leading to growing social and environmental protests. The conditions for social unrest continue to be high across North Africa, with the COVID-19 pandemic adding further pressures to what observers have deemed a constant renegotiation of the social contracts between government and a (young) population. In Morocco and Tunisia this has happened through sporadic protests, while in Algeria, mass protests have taken place in the past two years. Together with the historically low oil prices across the region, economic conditions following the pandemic will make conditions worse in many of these countries and may lead more people to join the demonstrations and protest (O'Driscoll et al. 2020). The low oil prices are a particular concern for Algeria, in light of its declining production as a result of project delays, difficulties in attracting investment partners, infrastructure gaps, and technical problems. Algeria is estimated to need \$ 135/barrel to break even (Interview January 2021).

Since 2011, there has been a steady rate of protests against governments in Tunisia, Algeria and Morocco, with a steeper rise since 2016. In Tunisia, lawmakers and political opposition have called for a "thirst revolution", blaming the government for mismanagement of water supplies. Reportedly, in 2015, "5 billion cubic meters of water flow into the sea every year that could be diverted for farming and residential use, and

²⁰ This includes technical advice on how to support their agricultural production, such as information on new agricultural techniques, improved crop varieties, better livestock control, improved water management, and the control of weeds, pests or plant diseases.

that 30 percent of water in reservoirs is lost because of leaks in damaged pipes" (Al Arabiya 2016). Protests have erupted around the use of water by the aforementioned solar power plant in Ouarzazate. While the solar plant requires large amounts of water for cooling and cleaning, surrounding villages struggle with access to drinking water, which is also in high demand for the production of thirsty export crops, for example watermelon (Zaireg 2017). Here too, this has led to so-called 'thirst protests', including in Zagora, Morocco, in 2017 (Kasraoui 2017).

Another important example are the environmental protests against shale gas fracking in Southern and Central Algeria. In addition to the environmental protest movement that has emerged in In Salah (Southern Algeria), the region around Ouargla (in the centre of the country) has witnessed protests since 2011 stemming from a mixed set of grievances. These include rapid population growth, unemployment, agricultural decline and decreasing cross-border commerce following closure of the borders with Libya, Tunisia and Mali due to security concerns (Crisis Group 2016). Since 2014, protests have also been launched against the government's fracking plans, leading to a coalition between (especially young) unemployed and environmentalist activists (including students and engineers), and a shared critique against the economic, political and environmental neglect of the region by the central government (Crisis Group 2016).²¹ According to protesters, the fracking plans in In Salah and Ouargla would risk polluting the water tables in the various planned drilling sites, a critical issue in a context of heavily declining surface and groundwater levels in Algeria.

Risk for recruitment in violent or criminal activity

Third, but to a lesser extent, some research suggests that loss of livelihoods in rural and urban areas could create a push factor for recruitment into violent or criminal activity, or even violent extremist groups. For example, research by Adelphi on the impact of climate change in the Lake Chad region has shown that as a result of further erosion of already fragile livelihoods and economies around the lake, especially young males have been vulnerable to recruitment into armed (opposition) groups. This takes place in a "context of social and economic inequality, perceived lack of state legitimacy, [...] and the lure of financial incentives offered to potential recruits." (Vivekananda et al. 2019). Climate change as such is thus not a direct driver of recruitment, but a factor that could intensify the reasons for potential recruitment, for example alternative sources of protection, income, belonging and livelihoods.

Currently, there is no evidence that this is happening on a similar scale in North Africa. North Africa, in particular Tunisia, and to a slightly lesser extent Morocco, have seen the mobilisation of foreign fighters into groups in Syria's civil war and Islamic State (IS) controlled territories (Watanabe, 2018). This group of young (mostly) men, but also women and children, in and of itself could pose a risk in light of the potential return of these foreign fighters and lack of viable employment opportunities for young people. However, an important difference between the Lake Chad region and North Africa is the presence of a strong state and security apparatus, especially in Morocco and Algeria, which have a strong control over their territory. Around 2017, there were serious worries that despite a setback for IS both in the Levant and the Maghreb, vulnerable, marginalised youth groups constituted a possible recruitment pool for IS, given existing grievances which could be responsive to jihadist criticism of corrupt local regimes (Crisis Group 2017). These security and surveillance systems, including counter-terrorism units, are expected to be able to stem threats emanating from returning foreign fighters, for example the risk for recruitment among youth (in particular men) seeking alternative

²¹ See also: [Unemployed movement in oil and gas rich Ouargla town, Algeria.](#)

livelihoods, or being able to extend their network and fight within North Africa (Watanabe 2018). Notwithstanding, the risk remains latent, with some 10,000 foreign fighters expected to have joined IS in recent years (ISS 2017), and security services across the region continuing to dismantle terrorist cells of reported IS-affiliates (The Arab Weekly 2020).

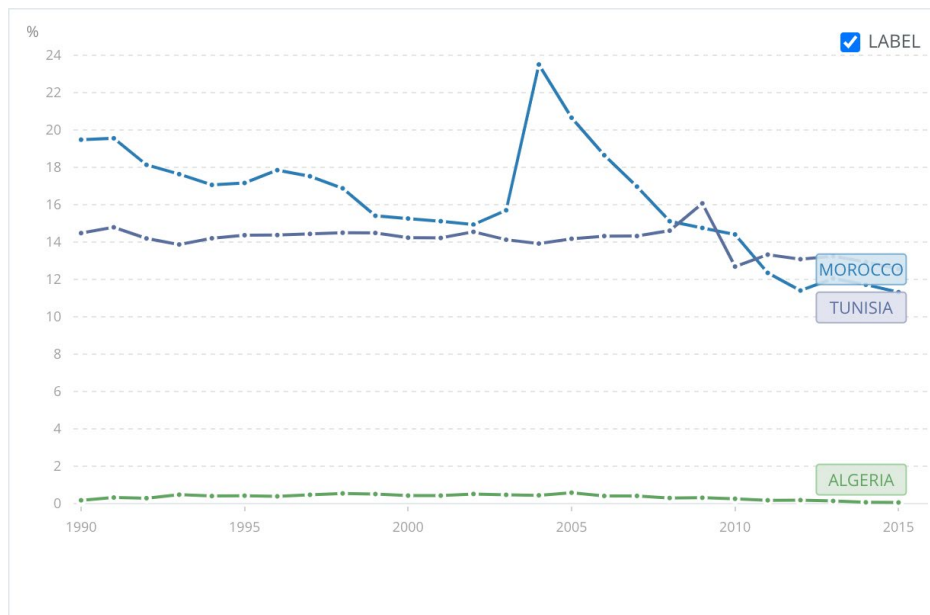
While there is little evidence of a direct link between climate change and recruitment into violent (extremist) groups in North Africa at the moment, there is clear evidence that climate change is having direct impacts on both rural and urban livelihoods, not in the least from a gender-sensitive perspective. This should include looking at the vulnerability of men to recruitment into violent extremism, even at a small scale, coming primarily from a feeling of emasculation and humiliation as a result of declining livelihood and income, and decreasing socio-economic status. Responding to the growing impact of climate change on rural and urban livelihoods will be a litmus test for North African governments aiming to manage economic growth and human development in a context of dwindling (natural) resources.

Policy incoherence and weak climate governance

A third possible form of climate-related security risks are the risks related to the unintended (negative) consequences of climate change policies in North Africa, as a result of incoherences and contradictions in these policies. This is notably the case with regards to the energy transition from fossil fuels to renewable energy, which has implications on the use of resources such as water, land and government spending, and poses questions related to employment.

It remains an open question whether (investments made in) renewable energy plants across the region will be used to export renewable energy (including to Europe) or to meet the growing need for energy at home, i.e. securing domestic consumption of renewable energy, as part of a green transition towards renewable energy consumption and production. Despite growing investments in renewable energy in North Africa, notably solar power, and despite the huge potential for solar and wind energy in the region, domestic consumption of renewable energy in Tunisia, Algeria and Morocco remains relatively low compared to the growing domestic energy demands. In Tunisia and Morocco respectively, around 11% and 12% of the total energy consumption stems from renewable energy, and less than 1% in Algeria. (WB data, see graph 4 below).

Graph 4. Renewable energy consumption (% of total final energy consumption) - Morocco, Algeria, Tunisia



A slow transition to renewable energies

Historically, the enduring energy subsidies have distorted price signals and led to a systemic misallocation of resources, including discouraging the development of alternative energies (Fattouh and El-Katiri 2013). In each of these three countries, there are strong interests at play that either hold back sustainable investments in the expansion of renewable energy infrastructure, or hold back increased domestic energy demand. External factors, such as the role of the European market for renewable energy are also at play (see section 4 below).

Algeria is the country that remains the most dependent on hydrocarbon exports of all three countries, with a slow rate of reforms towards non-hydrocarbon energy production (and export) and a system of government subsidies for fuel. There are powerful interests at stake that have slowed down reforms from so-called special interest groups that benefit from in particular gas, and oil revenues. The energy sector has been marked by inefficiencies and scandals in the state-owned energy company Sonatrach, seen as the scene of a power struggle between the government and ministry officials and the intelligence services. This has been further hampered by a slow expansion of the private sector, but also by unrealistic expectations about foreign investment for increasing the output of existing oil wells and exploration of shale gas. (Crisis Group, 2018) which have been met with environmental concerns (see below). Reform initiatives have included attempts to diversify the economy, reform Algeria's agriculture, legalising part of the informal trade sector; lifting some of the bureaucratic obstacles to entrepreneurship (including by youths) and stimulating the Maghreb's economic integration (Crisis Group 2020b) - with little progress so far.

Analysts have warned of a deepening political crisis with mass protests, if these reforms, pushed by international financial and monetary institutions are rushed by the government, combined with harsh economic conditions. According to experts, Algeria is facing stagnating natural gas production and rapid domestic gas consumption growth (fuelled by an unsustainable domestic energy pricing policy), constraining the country's

gas export potential and revenue (Ouki, 2019). While some have made linkages to the country's civil war during the 1990s (Crisis Group 2020b), many experts note that the Hirak protests since 2019 have been peaceful, with many Algerians determined to avoid bloodshed and a consistent rejection of violence by the protesters (Interviews, January 2021) (Hawthorne and Werenfels 2019). Nevertheless, mass reforms to the energy sector with economic and environmental implications will be sensitive in the current context, and difficult given the vested interests of political, military and business elites under the past regimes (Hawthorne and Werenfels 2019). The discovery and production of shale gas, seen as a way to respond to growing domestic demand and retain export markets, have raised serious environmental concerns over the destruction of fragile desert aquifers and water demands, and some violent protests have been met with police violence (Moreau 2015).

By contrast, investments in renewable energy, notably solar power are huge in Morocco. Morocco has embarked on a process to become less reliant on fossil fuels. But critical questions are being asked around the scale of investments to establish the necessary infrastructure, the centralised decision-making around renewable energy investments (Brouksy 2016), and its impact on resources and communities (Hamouchene 2016). Renewable energy infrastructures often require considerable use of scarce resources, notably water, for example to cool desalination plants or clean solar power plants (as a result of dust and dust pollution). Growth in the renewable energy market will mean that already scarce resources will need to be managed in a manner that is seen as equitable and sustainable. This requires balancing different needs, and some examples suggest that this is not easy to achieve. For example, the construction of the Ouarzazate concentrated solar plant required re-allocation of communal lands. Communal lands owned by small-scale livestock herders were sold at low prices given that the price of land in the region was increasing in value as a result of speculation and the growing demand for land by agri-business and commercial livestock markets (Hamouchene 2016). This led to considerable frustration among small-scale farmers and livestock herders in the region.

Competing demands for the use of scarce water

Another source of tension and incoherence in Morocco has been the contradiction between Morocco's leadership on climate change adaptation and solar power, and its agricultural and tourism strategies. Its former agriculture strategy, 'Plan Maroc Vert', continued to focus on water intensive export crops while its strategy for the tourism sector, part of efforts to diversify the economy, also demands intensive water usage (AfDB 2012). In February 2020, a new agricultural development plan, 'Generation Green 2020-2030' was launched, jointly with a country wide forestation plan. 'Generation Green' aims to expand Morocco's middle class by mobilising young farmers and doubling agricultural exports, and includes efforts to expand irrigation, for example by sea water desalination (Hervé 2020). It remains to be seen how this plan will address the challenges of sharing scarce water resources and arable land in a context of increasing climate change challenges.

So, while governments in North Africa are attempting to invest in a green energy transition, there are considerable incoherences and contradictions in these policies that undermine the potential positive effect of these plans, for example by further depleting scarce resources such as water, or by exporting green energy instead of using it to respond to growing domestic energy needs. This is the case not only for the Ouarzazate solar power plant, but also for the Tunur Solar Project in Tunisia (Hamouchene 2020).

Growing environmental protests

In recent years, these contradictions have led to more instances of social protest with an environmental angle in Morocco, Algeria as well as Tunisia, including the so-called thirst protests in Morocco, and protests against the mismanagement of water infrastructures in Tunisia (see above). Protests against the environmental impacts of fracking and shale gas, in particular in Algeria's disenfranchised Southern region have been taking place since 2013-2014. Analysis points to the underlying governance questions that underpin these environmental protests, which often go hand in hand with demands for more jobs and stronger devolution of power from the central governments and the role of European (private sector) actors. For example, in December 2014, protests erupted in In Salah some 1,200km south of Algiers, against the permission given by the government to conduct tests by the French company Total techniques for unconventional fracking techniques, previously outlawed in France. According to analysis this was "the result of high levels of education, particularly about the hydrocarbons sector; a traditional environmental consciousness, especially among women; and social media forums like Facebook, which spread information on fracking risks." (Crisis Group 2016) In addition, the area has previously been used to test new and dangerous technology, including French nuclear weapons in the 1960s (*Ibid.*). It should be noted that recently, the Algerian government announced an ambitious target to increase the production of solar energy from 2 percent of total installed generation capacity in 2018 to 15 per cent by 2028. Despite this target and ongoing initiatives to expand Algeria's renewable energy potential, progress has been very slow. As a result, "renewable energy sources are still far from being able to achieve a significant share of Algeria's future energy mix and heavy reliance on natural gas to generate electricity will continue, at least until the end of next decade." (Ouki 2019)

The above examples indicate that there is a growing environmental aspect to social protests across the region, fuelled by a discontent around political participation and contradictions between economic policy choices and the environment, suggesting weak climate governance. As climate impacts are expected to worsen, there will be a growing need to address these contradictions and incoherencies to formulate effective responses and adaptation to climate change.

Compounding risk factors for cascading climate-related security risks

Within the context of climate change in North Africa, two additional risks are observed that could further hamper addressing climate change and promote climate resilience from a regional perspective. First is the observation that social protests, spurred by tension triggered by climate change effects take place in the context of authoritarian regimes with limited involvement of civil society. Second is the lack of regional cooperation and dialogue between the countries in the Maghreb, or across the Mediterranean Basin, which discusses the linkages between climate change and potential security risks.

Authoritarian regimes and climate-related security risks

In North Africa, social protests, climate change effects and adaptation efforts take place against the background of a regime marked by low levels of political and civil liberties, with the exception of Tunisia. According to Ide et al. (2020), authoritarian regimes, in the face of droughts and resulting water-cuts, with pre-existing political cleavages, create additional risk for low-level conflicts including (social and environmental) protests. This is because citizens might feel that they lack effective means to articulate their grievances.

Low political participation, regional inequalities and abuse of centralised power, and the resulting deficits in public institutions' efficiency and accountability, were major triggers of the 2011 uprisings across the region (Houdret and Harnisch 2019).

Slow pace of democratic reforms across the region

Following the Arab Revolts, only Tunisia saw a regime change as a result of popular protests. Since then, significant reforms have taken place in the country, but with ongoing challenges. For example, rural-urban disparities continue to lead to frustrations, while unemployment is still high, especially in the interior regions among the educated youth, and among women (EBRD 2019).²² Wide ranging reforms to address corruption, plug public financing gaps and promote private sector investment still seem difficult to put in place (Byiers 2018).

Some reforms have taken place in Morocco since 2011, where more decentralisation, participation, and stronger public-service provision appeared in the regime's reform strategies, and more specifically in the 2011 constitution and within the so-called 'régionalisation avancée' (advanced regionalisation) (Houdret and Harnisch 2019). So far, experts have deemed the progress mixed, with even calls to re-centralise. Observers have been critical about the centralised decision-making around renewable energy projects in Morocco, in particular with regards to the role of King Mohammed VI, and investment funds connected to the royal family (Brouksy 2016). Given the centralised nature of decision-making and profits from renewable energy plants, some analysts worry that these profits will not trickle down to local authorities and communities (Hamouchene 2015) and further fuel grievances.

In Algeria, popular protests made an end to the 20 year rule of President Bouteflika in 2019, but reforms have been deemed too slow and the country is generally seen as facing severe restrictions on political participation and freedom of expression.²³ Deficiencies in public government are tightly linked to the role of ruling political and business elites with ties to the energy sector (in particular gas) in Algeria, presenting important challenges to a green energy transition, away from hydrocarbons, as discussed above. The discovery and production of shale gas is seen by some as having the potential to meet a rising domestic energy demand and allow Algeria to maintain its export markets. But protesters in different parts of the country (notably Ouargla and In Salah, see above) have highlighted the environmental impacts associated with the production process, in particular destroying a delicate desert aquifer system shared by Algeria, Libya and Tunisia, as projections calculated some 5 million gallons of freshwater would be needed to fill up the shale well (Moreau 2015).

The Maghreb's continuing gender gap

Women and girls merit particular attention when assessing future scenarios for climate adaptation and resilience, especially the context of enduring gender disparities in the region despite reforms that have taken place since the start of the Arab Revolts in North Africa. The MENA region ranks last in the 2020 Global Gender Gap Index, based on calculations of the gender gap between women and men in four key areas: health, education, economy and politics. Morocco and Tunisia in particular have taken steps to prohibit gender discrimination through national labor codes. Morocco and Tunisia have also prohibited gender discrimination and explicitly recognize gender equality in their (revised) Constitutions (Benabdallah et al. 2020). But gender discrimination in the labor

²² Unemployment remained high at around 15 per cent in 2019, and especially among young people (34.4 per cent), women (22.6 per cent) and graduates (28.2 per cent).

²³ Freedom House, [Algeria](#), accessed December 2020.

market is still high in the region, where in 2019 women faced both significantly higher unemployment rates and significantly lower employment rates. As such, women continue to face obstacles, despite legislative reforms, to political participation and workforce participation, to a large extent as a result of existing norms and beliefs (Robbins and Thomas, 2018).

This is also reflected in the challenges women face for climate resilience and adaptation in the agricultural sector. In all three countries, women in rural areas face considerable challenges to respond to climate change effects, given their lack of decision-making power and the unequal access to and control over assets. This translates into lower access to resilience measures, including training, information and climate adaptation financing (GIZ 2018). Female ownership of agricultural land is extremely low, with high levels of informal employment. Women are also under-represented in grassroots organisations and professional organisations, for example in Tunisia (GIZ 2018). In Morocco women were found to be underrepresented in community-based natural resource management bodies (Ibid). In some areas of Tunisia, women's agricultural organisations are increasing, but they face difficulties in accessing institutional and financial resources. Efforts to increase women's decision-making power and participation in climate adaptation and resilience have so far seen mixed results (see section 4 below).

These governance challenges point to important weaknesses of possible resilience to climate change, and undermine these government's capacity to cope with the negative effects of climate change. Institute for Economics and Peace (IEP) has measured factors that generate resilience and capacity to cope against the level of climate vulnerability by using their own Positive Peace Index, which sets out eight pillars of positive peace. This includes a sound business environment, the equitable distribution of resources (including across genders) and free flow of information and low levels of corruption. Another element of positive peace is found in good relations with neighbours (IEP 2020), which will be discussed in more detail below. While these indexes allow us to give a proximate assessment of the current state of resilience to climate change and possible strengths and weaknesses to deal with them, they give us little information about future policy choices and challenges.

Lack of regional cooperation and dialogue

In addition to these possible strands for climate-related security risks in North Africa, the region lacks effective regional cooperation for climate change as well as political cooperation more broadly. This is problematic given the importance rendered to good relations with neighbours to cope with cascading climate risks.

Lack of formal and informal cooperation

Beyond formal and informal regional constellations, there is some level of cooperation on intelligence despite the lack of official diplomatic cooperation, notably between Morocco and Algeria. Some countries are bound by security agreements. For example Tunisia and Algeria have multi-level cooperation on security and border control (El Dahshan and Masbah 2020) But overall, experts have noted that in the diplomatic arena, North African countries are known for their 'excessive bilateralism'(De Groof et al. 2019). Bodies such as the Union du Maghreb Arabe (UMA), which brings together Algeria, Libya, Mauritania, Morocco, and Tunisia were intended to transcend this, but have not been successful (De Groof et al. 2019).

The Union for the Mediterranean (UfM) was designed as a regional cooperation body bringing together 42 member states across the Mediterranean Basin: the 27 EU member states and 15 Mediterranean partner countries. This makes sense given the shared

challenges faced with regards to climate change, as well as the high interconnectedness of energy grids and pipelines (Cienski and Hernandez 2020). The UfM has been active on climate issues, with Energy & Climate Action being a focus area of the intergovernmental organisation. But despite an ambitious programme carved out by the Barcelona Declaration, the organisation is seen mostly as a technical body, with a weak political mandate to push more deepened regional security cooperation. (Interview, January 2021) Another forum, the 5+5 Dialogue, serves as an informal sub-regional forum for the ten Western Mediterranean countries group: five from the north of the Mediterranean (Spain, France, Italy, Malta and Portugal) and five from the southern shore (Algeria, Libya, Morocco, Mauritania and Tunisia). While informal, several observers have noted that this forum manages to bring the Algerians and Moroccans together to discuss important regional issues, including defence and foreign affairs.²⁴ Finally, Morocco, Algeria and Tunisia are all part of the United Nations Economic and Social Commission for Western Asia (ESCWA) bringing together some 20 Arab countries, and with a mandate to work on food security, water, energy and climate change (Mokhtari 2020).

Regional competition extends to climate adaptation and energy

But all in all, the spirit of relations in North Africa, and in particular between Morocco and Algeria is one of competition rather than cooperation. Morocco and Algeria also extend this competition with regards to their respective policies towards Sub-Saharan Africa. Notably this includes access to Sub-Saharan Africa's energy markets, and in particular to export of hydrocarbons and gas with the pursuit of competing gas pipelines to West Africa (Interview January 2021). Plans for a pipeline from Algeria to Nigeria have long existed, but a more recent agreement for a pipeline from Nigeria via Morocco to Spain signed in 2016 appears to have better prospects (Werenfels 2020). This is expected to position Morocco as an ideal transit hub between the Mediterranean and energy exporting African countries, in particular for Nigerian gas (Mokhtari 2020).

Morocco is seen as having the most sophisticated strategy towards Africa, and notably West Africa, where it has expanded its presence significantly since the current King of Morocco, Mohammed VI came to power in 1999. In addition to the activities of insurance companies, telecommunications and banks, and agricultural export, the export of renewable energy technology is a hallmark of Morocco's engagements in West Africa, but also increasingly in East Africa. The central objective is to open new markets, especially for businesses controlled by the royal family, which notably includes renewable energy. (Werenfels 2020). Algeria on the other hand has operated more as a security actor and as a peace mediator with direct engagements in Mali, driven by its worries about foreign intervention and activities (by the EU and the US) in its immediate neighbourhood. Algeria's President Tebboune announced Algeria's "return to Africa" in early 2020, driven by a desire not to leave the playing field entirely to Morocco (Ibid). Tunisia is seen as struggling to catch up, while slowly expanding its outreach driven by its private sector but hampered by political instability.

Overall, it seems the challenges posed to the region as a result of climate change and the related security risks are not addressed extensively between these governments at a regional level. As de Coning and Krampe (2020) note, there are examples of how multilateral cooperation at sub regional levels, particularly if amplified by the AU and UN levels, can contribute to preventing, mitigating and adapting to climate change. That this type of multilateral sub regional cooperation is missing in North Africa undermines the ability to find shared ways to share analysis of the interplay between climate change,

²⁴ [The Dialogue 5+5 – IEMed](#).

security risks and potential transboundary conflicts, and hampers collective ways to address these security risks.

Possible future scenarios

As mentioned in section 1, how countries will adapt to climate change will depend heavily on the adaptive capacities and resilience of a given country. These adaptive capacities reflect the strengths and vulnerabilities of existing socio-ecological systems and governance structures. How climate change will affect countries, and how well-equipped these are to absorb climate effects and shocks in future scenarios is a key component of the work being conducted under CASCADES over the course of 2021-2023.²⁵ Scenarios have become increasingly popular in environmental policy making, and are understood as “descriptions of possible situations and chains of events with explicit reference to the future” and consist of both the situation in the future and the development leading up to that situation, including the present (Bressan et al. 2019)

Climate-related scenario-building

Two important models for scenario-building in international environmental policy making, have been the so-called ‘shared socio-economic pathways’ (SSPs) and the ‘representative concentration pathways’ (RCPs), which have been developed complementary to each other. The RCPs describe different future levels of greenhouse gas emissions, amongst other issues²⁶, but purposefully leave out socio-economic factors. The RCP set out a large range of mitigation targets and global warming levels, from continued warming rising by 4.3 °C above pre-industrial levels by the year 2100 to limiting warming well below 2 °C (as called for in the Paris Climate Agreement). The SSP modelling aims to show how socioeconomic factors may change over the next century, including population, economic growth, education, urbanisation and the rate of technological development, i.e. important elements of adaptive capacity. They are coupled to so-called SSP narratives and aim to describe how different levels of climate change mitigation could be achieved in the future (Hausfather 2018). The two models are now being used for the preparation of the IPCC’s sixth assessment report, expected in 2021 (IPCC 2007).

There are now five SSPs, which are accompanied by so-called narratives, ranging from more optimistic scenarios involving either low challenges to mitigation and adaptation (e.g. under a green transition fuelled by a consumption which is oriented toward low material growth and lower resource and energy intensity, SSP1) or more pessimistic scenarios of resurgent nationalism with concerns about competitiveness and security and high challenges to mitigation and adaptation (Hausfather 2018). Each of these SSPs can then be reflected through different projections for GDP, population growth, emissions etc, and are expected to help identify policy recommendations and responses to strengthen future resilience.

²⁵ At the time of writing, regional workshops to develop scenarios for climate change adaptation were being prepared as part of the work under CASCADES.

²⁶ Representative Concentration Pathways (RCPs) represent different emissions, concentration and radiative forcing projections.

Localisation of climate adaptation

An important caveat is that these SSPs reflect global future scenarios, and might not necessarily reflect local relations or adaptive capacities of a certain region or locality. Especially for regions where significant negative climate change effects are expected, this is an important component of climate adaptation. North Africa is projected to become a climate change hotspot, expected to become hotter and drier over the next century. But the countries vary in terms of their expected capacity to cope and adapt to these climate effects. The IEP's Ecological Threat Register has attempted to measure this by linking their climate change vulnerability against eight components of resilience set out in the IEP's positive peace framework.²⁷ Based on this framework, Tunisia is expected to be best equipped to adapt, while Algeria is expected to be least equipped at the moment, while Morocco is in between. Of all three countries, Tunisia is deemed to have a better functioning government, less corruption and a more equitable distribution of resources (IEP 2020). For example, according to this framework, in the case of water stress, Tunisia may have a sounder business environment to build the necessary water conservation infrastructure to improve the efficiency of water usage and agriculture and industrial sectors. It is also deemed to have a (more) effective government which could complement this with planning, implementation and monitoring of water sharing and conservation schemes (IEP 2020). However, recent political developments in the country indicate a highly unstable environment. Tunisia is marked by an increasingly fractured parliament and continued elite in-fighting. Turnout for the parliamentary elections in October 2019 was low, around 30%. The first government formed lasted only three months. The second, technocratic government which took office in September 2020 has not managed to pass any significant legislation (Interviewee, January 2021).²⁸

The role of women in climate adaptation

Women will play a crucial role in North Africa's future policy choices around climate adaptation. Currently, there is a risk that women will face a diminished capacity to anticipate and cope with climate change impacts as a result of the lack of access to funds and information, decision-making structures and education opportunities but also the underestimation of their (unpaid and/or unaccounted) work and expectations about the role they should play (Benabdallah et al. 2020). This is despite laudable efforts to fight gender discrimination, to generate incomes for rural women and despite the important role that women and girls play in the management of natural resources and agricultural production and processing (Benabdallah et al. 2020). For example, research into the impact on women as a result of Morocco's 'Plan Maroc Vert' has found that despite efforts to expand income generating activities (IGA), women's participation in IGA and rural cooperative decision-making structures remains very low. The research also pointed to important divides between educated and uneducated women in benefiting from IGAs and cooperatives structures. Educated women found to benefit more often economically from cooperative structures, compared to uneducated women, and to be better placed to manage both financially and administratively. By contrast, uneducated women were most often "employed as a cheap or even free labor force under the managing directives of educated people who are in a prime position to create cooperative structures. (Montanari and Bergh 2019).

²⁷ The IEP's Positive Peace framework is underpinned by the IEP's Positive Peace Index, a global set of indicators for each of the eight pillars of positive peace. See: IEP 2019 pp. 85-86.

²⁸ See Knaepen, H. for a more in-depth discussion on climate-related development risk in Tunisia (forthcoming, February 2021).

If these plans do not succeed at empowering rural women, this may present an important obstacle to generate resilience to climate change across rural communities. According to Montanari and Bergh (2019) in order to promote gender equality, changes need to occur both across institutions (education, legislation²⁹ and political participation), but also at the societal level (recognizing the role of women in climate adaptation). Important to note here too however is the prominent role that women have played in some of the large environmental campaigns and protests across the region. This environmental consciousness is often tied to their role in managing resources, in particular water. For example, the protests movements in central and Southern Algeria since 2014 have seen vocal participation by women, leading marches and speaking with the press. Given their role in managing water, women are seen as especially aware of the potential impact of gas fracking to pollute groundwater (Crisis Group 2016). Interventions designed to support climate adaptation and strengthen climate resilience should be sensitive to these gender-specific changes and opportunities to strengthen the role and adaptive capacity of women.

Governance and vested interests to define future climate adaptation

What different indices and scenarios do not tell us, is why certain policy decisions are (not) being taken, and what interests lie behind them. As indicated above in section 3, there are strong clientelistic interests at play in Algeria's energy sector that lean towards continued dependence on gas (exports), and blocking private sector reforms that could stimulate economic diversification, including for renewable energy. Renewable energy production remains low, or is geared towards export for Europe in Tunisia and Morocco, despite growing domestic energy demands. In both Morocco and Tunisia, export-oriented agricultural policies are strangling groundwater resources, further depleted by the expansion of water-intensive sectors such as tourism, growing demands to cool solar power plants (for export-oriented energy production), or for the expansion of phosphate industry in Tunisia and Morocco (Rousselin 2018). These interests will be key defining factors that shape the future of these countries' adaptation to climate change. Identifying these interests and their impacts on climate adaptation, including for Europe, will be a key component of follow-up policy briefs and as part of our research under CASCADES.

²⁹ For example, in 2014, Tunisia adopted a climate change law that includes attention for women's rights, gender inclusion and sustainable use of natural resources.

Implications for Europe

As mentioned in section 1, we apply a conceptual framework that looks at ‘cascading climate risks’, meaning that climate risks can cross systems and sectors, but also national and regional borders. This includes the transboundary *impacts* of climate change, but also refers to the transboundary effects of adaptation – positive or negative – made by one or more countries that have repercussions for other countries.

Cascading climate risks and policy coherence

As outlined by Mackie (2020) the European Union (EU) has promoted the concept of policy coherence for sustainable development (PCSD), with a focus considering the outward effects of its policy choices. The concept of cascading climate risks applied in this paper also means that the EU will need to increasingly understand climate risks cascading inwards from beyond its borders. This, according to Mackie (2020) is a relatively novel challenge, with serious policy implications. A key question for Europe will be how cascading climate risks, including both the climate impacts and the effects of adaptation will transmit between Europe and North Africa (in both directions), given the strong links via trade and value chains, financial ties, as well as security, development and foreign policy. Below, we focus on four possible implications.

First, transmission of cascading climate risks will **not be limited to one sector**. For example, migration as a result of climate change is taking place within both also outside of North Africa while the key push factor is more often linked to a loss of livelihoods, socio-economic grievances and human security concerns. In other words, policy solutions to tackle a complex set of issues will not just be environmental, but also need to involve social and economic measures all of which need to be coherent with each other. **Second**, these **issues cannot be resolved by the European Union alone** and will need to be tackled by and with national and local authorities, as well as in cooperation with other regional and international partners. Third, **policy incoherence risks undermining the effectiveness of policies**, if policies in one area or sector (gender, rural development, natural resource management) are undermined by policies in another sector (foreign policy, security, energy policy). **Fourth, promoting policy coherence will be a long-term, unending and political effort**. Interest groups in each sector will push for one or the other course of action. Building policy coherence ideally is an iterative process, where promoting changes will take a long time, and where accepting a “‘good enough coherence’ is a valid interim objective.” (Mackie 2020)

Policy coherence challenges for Europe

For the remainder of this concluding section, we discuss policy coherence challenges for Europe, and what it will mean for dealing with three cascading security and development risks, building on what we have discussed in section 3:

1. Renewable energy and green transition

Significant external and policy implications for Europe are expected with regards to renewable energy, which could have unintended and potential negative impacts. Currently there are different speeds at which the three countries in the Maghreb are developing their renewable energy markets. While Morocco is regarded as a regional leader with regards to solar panels, there are concerns about the impact on soil, land and water for the construction and maintenance of solar power plants. Another picture emerges from Algeria, with a continued reliance on hydrocarbons (94% of exports) and the potential for stranded assets as a result of Europe's green energy transition. As Europe moves away from hydrocarbons, Algeria could end up with no market for oil and gas exports leading to major budgetary issues, growing indebtedness, austerity policies and potentially more social and environmental protests, possibly leading to higher levels of out-migration. This risk is tangible, given the limited progress in economic diversification in Algeria's energy sector, and economy overall. To date, there has been little evidence of a real domestic demand or real progress to expand domestic consumption of renewable energy in North Africa, and pushed by external (including European) investments and interests (including by domestic elites) the bulk of green energy flows from the region to Europe. According to experts, this has been mainly driven by unsustainable domestic energy price subsidies (Ouki 2019). The Algerian government has recently announced an ambitious 2028 target for the use of solar energy. According to Ouki (2019), the "projected increase in the share of solar energy from 2 percent of total installed generation capacity in 2018 to 15 per cent, or more than 5,000 MW by 2028, raises questions about the challenges of expanding the country's existing renewable energy capacity of less than half a GW to over 5 GW." ³⁰

For now, domestic renewable energy consumption in North Africa remains low and/or expensive, while the negative effects (overuse of scarce resources such as water, and land-grabbing) of export oriented renewable energy production towards Europe are externalised onto North Africa. As part of its climate adaptation policies, including the EU Green Deal and the new EU Adaptation Strategy, the European Union will need to consider the risks of cross-border and cascading impacts to mitigate these negative effects. Currently, there is a high level of mutual dependence between Europe and North Africa regarding energy demands, and experts expect that this will continue with the transition to renewable energy. The majority of renewable energy for European markets will continue to be produced in North Africa, with high expectations about the future of hydrogen production in the region. There are also high expectations about job creation in North Africa's renewable energy sectors. At the same time, as discussed in section three, the environmental impact is considerable and is adding to a growing social and

³⁰ The Algerian government has recently announced an ambitious 2028 target for the use of solar energy. According to Ouki (2019), the "projected increase in the share of solar energy from 2 percent of total installed generation capacity in 2018 to 15 per cent, or more than 5,000 MW by 2028, raises questions about the challenges of expanding the country's existing renewable energy capacity of less than half a GW to over 5 GW."

environmental critique of governments across the regions. This will be amplified if the projected job creation expectations will not be fulfilled.³¹

2. Agriculture, environment and livelihoods

Landscapes across North Africa have increasingly become monocultures (Lazard, 2020) following years of export-oriented agriculture, increasingly dominated by agri-business, facilitated by EU trade agreements (Interview, January 2021). Declining rainfall is amplifying already existing patterns of unsustainable groundwater usage, as farmers switch to irrigated agriculture production. In many places across North Africa, access and allocation of resources such as water and land are strongly politicized in favor of political and economic elites involved in lucrative export-oriented agriculture, including for citrus fruits (e.g. Morocco) and olives (e.g. Tunisia) (Houdret, 2017, Verner et al. 2018), primarily destined for European markets. This model is undermining the livelihoods of small-scale farmers, and amplifying the dependence on food imports of key staple food products (OECD/FAO 2018). This makes the region not only vulnerable for agriculture productivity losses, but also for food price fluctuations, including as a result of harvest failures in import countries (Hilden et al. 2020). As a major export destination for agricultural goods from North Africa, the EU, plays a role in sustaining an unsustainable agricultural model that is depleting natural resources and aggravating environmental degradation, and potentially employing socio-economic grievances and loss of livelihoods (Hamouchene 2020). In addition to its agricultural export goods, Morocco and Tunisia are also important players in the production of phosphates, which are used as agricultural fertilisers, a key commodity global agricultural sector. As we've seen in section 3 the extraction of phosphates carries considerable negative impacts on the environment.

According to critics, North Africa's strategic importance is reflected in the negotiation of the 'Deep and Comprehensive Free Trade Agreements' (DCFTA) with Tunisia and Morocco, which entrench the extraction of precious commodities and the environmental degradation that goes with it (Hamouchene 2019). The DCFTAs are intended to replace the current free trade agreements, which have generally been seen to have delivered mixed, or even negative results, including because the principle of policy coherence was not applied sufficiently (see Grummiller et al. 2018). However, according to Riahi and Hamouchene (2020), the EU's DCFTA with Tunisia is "designed to insert the most profitable companies on Tunisian soil into the European free market and to condition the Tunisian market to supply the EU. These two objectives, although they may enrich a small elite in Tunisia, are contrary to most Tunisians' political, economic, social and environmental interests." The inability to address the negative impacts of agricultural export on scarce resources (water) or toxic commodities (e.g. phosphates) creates cascading effects into others policies domains (foreign policy, migration), and that the interests of a certain group (business/political elites) may not benefit other groups (small scale farmers, young unemployed). This does not bode well for providing a policy coherent answer to socio-economic grievances over diminishing livelihoods, a degraded environment and a (continued) lack of employment opportunities in turn could continue to lead to rural-urban migration within North Africa but also towards Europe.

³¹ For example, a 2012 study from the Mediterranean Forum of Institutes of Economic Sciences, Morocco's renewable energy sector could generate between 267,000 and 482,000 jobs in the country by 2040. For Tunisia, a 2016 study by GIZ projected more modest estimates: potentially 30,000 domestic jobs by 2030. See Bennis 2021.

3. Migration towards Europe

As discussed above, North Africa will face numerous socio-economic challenges in the next decades, related to a demographic transition, growing urbanisation, growing economies, amidst (slow) process of democratic reforms and a huge demand for job creation. These challenges will have an impact on stability and development, but also on migration trends, notably towards Europe. Migration has not been discussed extensively in this discussion paper, but merits attention from European policy makers when addressing climate change challenges in the region.

All three countries have historically been and remain significant countries of migrant destination, transit and departure. Economic, environmental and political instability contribute to partners of mixed migration, including refugees, asylum seekers, economic migrants and other migrants, in the sub-region. Along the so-called western Mediterranean route to Spain via sea and land, Morocco remains the main transit point in the sub-region towards Europe. As a result of securitisation of migration, tighter European border controls and the increasing cost of migration to other countries overland have changed the nature of immigration movements in North Africa (Bilgili and Marchand 2016). Since 2017, stricter border measures apply to the central Mediterranean route through Libya to Europe. In addition, the horrific human rights conditions faced by migrants in detention centres in Libya, have led migrants to seek alternative routes in the region (Pronczuk 2019, Bozonnet 2018, cited in Knoll and Teevan 2020). Tunisia, while overshadowed by Morocco and Libya is increasingly becoming a migration hub (Camilli and Paynter 2020). As Knoll and Teevan (2020) note, the socio-economic and political conditions in the region mean that emigration remains of great interest to the media and the general public across North Africa. In recent years, there has been an increase in the number of young people from the Maghreb attempting to cross to Europe through irregular channels. In 2020, Tunisians were the principal nationality arriving in Europe irregularly, followed by Algerians (Knoll and Teevan 2020).

To date, there is also no global instrument addressing cross-border migration related to climate change. A recent report by IOM noted that the systematic discussion and integration of climate change and environmental factors in migration policies and displacement frameworks remain limited or ad hoc (Traore Chazalnoël and Ionesco 2020). As such, the international legal landscape therefore leaves a legal and protection gap with regards to people who flee their country of origin or residence due to environmental reasons (Kraler et al. 2020). However, for many migrants, there is no distinction between the environment, their livelihood and the economy, given the considerable percentage of populations dependent on the agricultural sector for day to day income and (formal and informal) employment.³² While environmental and climate factors were found to play a role in driving migration in North Africa, there are always a range of other socio-economic factors at play (Wodon et al. 2014). Currently there is no framework to address the linkages between economic and environmental migration within the European asylum system.

Across the region, cooperation with the EU is a sensitive subject, and all three countries generally resist any European policies that could be seen as an intrusion on their sovereignty, in particular with regards to dealing with migrants within North Africa. EU proposals around migrant processing centres have been met with controversy. Still, the three countries have shown themselves more or less interested in cooperating with the EU on migration management in order to achieve other diplomatic and development goals (see Knoll and Teevan 2020). Morocco and Tunisia negotiated mobility partnerships

³² See also: [Migration and climate change: what can European cooperation achieve?](#) ECFR Event, 6 November 2020.

(MP) with the European Union, but talks have stalled over political and practical challenges (Abderrahim 2019). According to analysts, the signing of the MPs was done under economic and political pressure during a period of uncertainty and vulnerability (2013-2014). Algeria refused to sign an MP as the country “seeks to maintain limited and selective cooperation on migration with the EU” (Abderrahim 2019). One of the objectives of the MP was to improve the information available to qualified Tunisian citizens on employment, education and training opportunities available in the EU and also to make mutual recognition of professional and university qualifications easier. But according to Abderrahim (2019), various disagreements have marked the EU’s negotiations with Morocco and Tunisia on the double visa facilitation and readmission agreements. This could become a source of frustration (including for North African citizens), but has also affected trade talks between the EU and North Africa. But more importantly, managing climate-related migration will encompass a range of issues, such as urban development (as a major site for integration of migrants), job creation and education (Furthermore Wodon et al. 2014). Instead, the current approach by most Western powers, including the European Union, has been one of “restricted entry, discouragement of asylum claimants, and criminalization of undocumented migration - and, in some instances, are pressuring other countries to do the same.” (Herzer Risi and Burkett 2020) The focus on restructured mobility (and migration as a coping mechanism to climate change) can further lead to increased competition for limited resources and services, weaken social cohesion and weaken adaptive capacity to climate change (Vivekananda et al. 2019)

To date, there seems to be room for stronger policy integration that could lead to greater policy coherence between climate change, trade (including agriculture) and foreign policy (including migration). These examples show that cascading climate risks cross a range of policy domains, and that inconsistencies in one policy domain, region or sector, risks undermining progress elsewhere. These need to be considered when designing effective climate adaptation policies and measures, both within and outside North Africa and Europe.

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