

# Climate risks in Tunisia

Challenges to adaptation in the  
agri-food system

By Hanne Knaepen, ECDPM

---

Research Paper | February 2021



# Contents

Contents	1
Acknowledgements	1
Introduction	2
Understanding cascading climate risks	4
Climate vulnerability assessment of Tunisia's agri-food system	7
Three climate-related development risks	11
Looking ahead: implications for Europe	21
Conclusion	25
Bibliography	26

# Acknowledgements

I would like to thank several of my colleagues at ECDPM for their constructive suggestions on the different drafts of this paper, in particular Jean Bossuyt, Volker Hauck, Bruce Byiers and Sophie Desmidt. I want to especially acknowledge Martin Ronceray for his excellent research support. I am also thankful to the many Tunisia experts who made time for in-depth interviews in which they shared their critical insights. The assistance of Valeria Pintus, who advised on the production process, and Alexandra Beijers, who mastered the layout of this research paper, is also greatly appreciated.

# Introduction

*“The so-called Arab Spring has shown that social unrest is partly caused by unmet basic needs of the population for food and water. Thus, climate change may become an indirect driver of social instability in North Africa” (Schilling et al. 2020).*

Tunisia, home to almost 12 million people, is an upper-middle-income country, situated in North Africa between Algeria and Libya, and partly bordered by the Mediterranean Sea. The country has been experiencing economic growth since the 2000s and the Tunisian revolution and its aftermath have resulted in a relatively successful democratic transition. This led to Tunisia often being referred to as ‘the poster-boy of the revolution’. However, this transition is fragile and the country faces considerable political and socio-economic challenges, including high unemployment rates, especially among the youth.

The agricultural sector is central to the stability of the country, accounting for about 12 percent of its Gross Domestic Product (GDP) and employing approximately 16 percent of Tunisia’s labour force (USAID 2018). However, this sector is also highly prone to climate risks: rising temperatures and varied precipitation levels, coupled with increasing extreme events, such as floods and droughts, threaten agriculture, its availability of water resources, and consequently, the wider agri-food system and the country’s socio-economic development (Verner et al. 2018). In addition, the agri-food system is affected by the COVID-19 pandemic that has resulted in lower activity and subsequent losses in employment and income in the sector (FAO 2020).

In an already fragile context, climate impacts to Tunisia’s agri-food system could further trigger instability and by extension, possibly cause security risks. Even more, the culmination of these risks can have knock-on effects that cross borders, sectors and systems: climate effects can cascade and sometimes escalate through security relations, international trade, financial markets, international aid operations as well as migration. As Europe has important economic, trade, development and geopolitical links with Tunisia, it is also directly and indirectly exposed to the effects of a changing climate of which the fallout would materialise first in Tunisia’s agri-food system.

The goal of this study is two-fold: first, it aims to better understand how climate risks, triggered by weather-related shocks or slow-onset climate impacts, can have an impact on Tunisia’s agri-food system - with a special focus on the olives and wheat sectors, and potentially lead to national socio-economic and political volatility with cascading, spill-over effects in Europe; second, it aims to assess the level of Tunisia’s adaptive capacity, by taking a closer look at three sets of governance, political and socio-economic challenges that risk to reduce the country’s adaptive capacity and wider development. Hence, in this paper, they are referred to as ‘climate-related development risks’ and they include the following:

- The **first climate-related development risk** relates to poor governance, due to fragile and divided government coalitions, the prevalence of a rent-economy and related particular interest groups, the State's financial constraints, a weak institutional set-up for climate action, limited decentralisation and empowerment of local authorities, all contributing to the incoherence of climate policies in Tunisia.
- The **second climate-related development risk** is based on the country's high food import dependency (particularly wheat imports), exposing it to international food price shocks potentially caused by climate impacts, a lack of national food self-sufficiency, and a national market and trade system strongly geared towards the export of agricultural goods (particularly olive oil) for which monoculture farming systems have been set up that deplete natural resources and cause soil degradation.
- The **third climate-related development risk** is related to the fact that climate risks are compounded by long-standing inequalities between the interior regions and the affluent coastal areas, marked by declining employment opportunities and diminished agricultural livelihoods in remote areas, despite political promises of more transparent and efficient local governance. This causes challenges for climate adaptation that requires strong local responses.

This paper uses quantitative (i.e. scientific climate data) and qualitative methods (i.e. desk study and interviews). When assessing the climate-related development risks in Tunisia, it draws inspiration from ECDPM's political economy approach that allows deciphering formal and informal interests, factors and actors. This helps to understand how the incentive environment, behaviour and ideas, as well as the distribution of resources, rents, and power are being shaped (Byiers & Vanheukelom 2016; Byiers, et al. 2021).

This research paper is organised as follows:

- **Section 1** explains the concept of cascading climate risks. It also describes the link between climate change and development, and defines 'vulnerability';
- **Section 2** provides a historical and future climate vulnerability assessment of Tunisia's agriculture sector with a focus on the wheat and olives sectors;
- **Section 3** presents three climate-related development risks that reduce Tunisia's capacity to adapt to climate risks with a focus on the agri-food system;
- **Section 4** is two-fold: first, based on the three climate-related development risks, it starts looking at possible future scenarios; second, it reflects on the implications of cascading climate impacts in Tunisia for Europe and emphasises the need for adequate and coherent European policy responses.

This publication is part of a series of policy briefs on the topic of 'Climate Change and Foreign Policy in North Africa', published in the framework of the Cascading Climate Impacts (CASCADES) Project (2019-2023), funded through the European Commission's Horizon 2020 programme.<sup>1</sup> It is published in close conjunction with another recent paper by ECDPM's Sophie Desmidt on '*Climate change and security in North Africa: Focus on Algeria, Morocco and Tunisia*', which follows a similar approach while taking a wider regional perspective and a stronger focus on climate-related security risks.

---

<sup>1</sup> For more details, see: [www.cascades.eu](http://www.cascades.eu).

# Understanding cascading climate risks

## Cascading climate risks: a conceptual framework

Almost a decade ago, pioneering research demonstrated the direct and indirect links between natural climate hazards, food security and political stability from the local to global scales. The 2011 winter drought in China's wheat-growing region caused crop failure, resulting in China having to buy wheat on the international market. This, in turn, contributed to the doubling of global wheat prices that had a massive economic impact in Egypt, the world's largest wheat importer, where bread prices tripled. These high prices were a contributing factor to civil unrest (Sternberg 2012).

In recent years, the reach of climate-related environmental events beyond national borders has become increasingly apparent. They have also become a more important subject for research: from the extreme weather impacts of melting glaciers to the effects of increasing rainfall variability causing transnational drought and susceptibility to wildfires. These 'cascading climate risks', also known as 'transnational or transboundary climate risks, are climate risks that cross national borders, but also sectors and more broadly systems. 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 (Adaptation without Borders 2019). Benzie et al (2016) coined a framework with four categories of cross-border connectivity of climate risks, including via biophysical (transboundary and shared ecosystems or resources), trade (regional and global markets, international supply chains), finance (flow of capital, including the exposure of publicly and privately held assets overseas), and people (movement of people) connections or so-called 'pathways', that are transmitted through global systems. These four pathways are further underpinned by nine indicators to analyse countries' exposure to transnational climate impacts. These include index criteria such as 'transboundary water dependency ratio' (under the biophysical pathway), 'migration from climate-vulnerable countries' (under the people pathway) or 'cereal import dependency ratio' (under the trade pathway) (Benzie et al. 2016). The latter indicator is of particular relevance to this study and will be further discussed in the context of Tunisia's wheat import sector below.

Climate change may therefore be a triggering factor in altering economic stability as well as regional and global governance, forcing individual countries to re-think their approach to adaptation at the national level (Hildén et al. 2020). This raises the question of how to analyse the propagation of these cascading climate risks? Scheffran et al. (2012) present a model that depicts the causal effects chain from climate stress to societal instability. This chain is made up of four variables that define the levels of sensitivities in climate-society interactions, including climate change, natural resources (i.e. water, food and biodiversity), human security (including a wide range of human values and capabilities), and societal stability (i.e. riots, violent attacks or wars). These are all interconnected. The authors explain that

the changes in the climate system can affect natural resources. Consequently, environmental changes will influence human security and can ultimately trigger impacts and events that affect societal stability. There can be a direct connection between climate stress and societal instability (Scheffran et al. 2012; Detges et al. 2020; Rüttinger et al. 2015). However, Challinor et al. (2018) rightly point out that the techniques for assessing the transmission of risks across sectors and international boundaries are still limited. The challenge lies in the need to examine cascading climate risks from multiple angles by combining different methodologies and disciplines, including scientific research and socio-political analysis that can help identify the links between climate hazards and social issues that cross borders (Challinor et al. 2018). This requires complex multidisciplinary research that takes a comprehensive approach, integrating sectors, systems and people, who are not typically involved in climate policy discussions, such as market regulation or banking experts (Lewis & Lenton, 2015). As a result, cascading climate risks are still largely unexplored by policymakers and risk calculi (Challinor et al., 2018). However, there are a few good practice examples. For instance, global institutions such as the World Economic Forum and the World Trade Organisation are increasingly looking at the climate change-trade nexus. Or, multilateral development banks are increasingly taking into account how to address climate risks via different financial mechanisms and schemes. They also have internal mechanisms to screen projects for climate risks (Adaptation Without Borders 2019).

According to Mikaelsson (2020), two types of cross-border risks require immediate policy action: climate-related displacements of people and risks to food security as a result of weather-related shocks to (international) agricultural production and food supply chains (Mikaelsson 2020). As aforementioned, in this paper, the focus lays on the last type of risk. More precisely, it looks at how a combination of climate risks on Tunisia's agri-food sector, economic and political volatility could lead to socio-economic instability, with potential knock-on effects for Europe. Although it is widely recognised that *"climate change is [...] a stressor that may lead to the heightened risk of violence and conflict in an already fragile setting"* (Kohli et al. 2018), the ways through which climate-related development and security risks can lead to (violent) conflicts (like for instance, in the region around Lake Chad or in Syria) are not the focus of this paper. The Ecological Threat Register (2020), developed by the Institute for Economics and Peace, states that *violent* conflict due to ecological risk, such as water stress, is not of immediate concern to Tunisia, as - compared to other countries in the Middle East and North Africa - it has considerable capacity to mitigate the impacts of threats such as resource depletion, widespread displacement and political instability (IEP 2020).

## Linking climate risks to development

Climate change is the quintessential development problem: it involves complex interactions between climatic, environmental, economic, political, institutional, social and technological processes, all closely linked to development (Gupta & van der Grijp 2010, cited by Knaepen 2013). Therefore, poor people in developing countries will feel the impacts first and most, because of reasons including vulnerable geography and lesser ability to cope with damage from severe weather and climate impacts due to factors, such as less developed and more concentrated economies, weaker public administration with more limited resources to adapt and provide social protection, often within political systems that struggle to adapt to shifting population concerns, and so forth. Generally, climate change does not feature

prominently within the environmental or economic policy agendas of many developing countries.<sup>2</sup> This is concerning as climate risks are one of the contributing factors to countries' or regions' vulnerability.

The Intergovernmental Panel on Climate Change (IPCC) presents vulnerability to climate change as a function of a system's exposure and sensitivity to climate hazards, as modified by its ability to anticipate or respond – its adaptive capacity (IPCC 2007).<sup>3</sup> These three elements are defined as follows:

- Exposure: *“the inventory of elements in an area in which hazard events may occur. These elements include the presence of people, livelihoods, species or ecosystems, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be adversely affected.”*<sup>4</sup>
- Sensitivity: *“the degree to which a system can be affected by changes in the climate, and depends in part on how stressed the system already is. Poor people and communities will be more affected than the nonpoor as they may already face stresses before a climate event) to climate hazards, as modified by its ability to anticipate or respond.”*
- Adaptive capacity: *“the capacity of a system or community to adapt is determined by access to information, technology, economic resources, and other assets. Also, it depends on having the skills to use this information, the institutions to manage these assets, and on the equitable distribution of resources. The higher the level of development, the higher the level of adaptive capacity” (IPCC 2007; Cardona et al. 2012).*

The IPCC framework is used to understand the level of an area's vulnerability, based on location-specific physical climate impacts. References to the constituting blocks of 'vulnerability' (i.e. exposure, sensitivity and adaptive capacity) are made throughout the following sections when looking at the vulnerability of Tunisia's agri-food system. However, the IPCC paradigm does not take into account the level of vulnerability in an interconnected and globalised world for which this study relies more on above-mentioned research such as the work by Benzie et al. (2016).

<sup>2</sup> See: <http://www.oecd.org/env/cc/developmentandclimatechange.htm>.

<sup>3</sup> According to the 2007 paradigm, these three elements are seen as co-factors of vulnerability. In 2014, there has been a paradigm change that reported vulnerability as a characteristic internal property of a system delinking from exposure to hazard. Consequently, vulnerability is an internal property of a system that enables assessment of 'hazard-specific' vulnerability by selecting 'hazard-relevant' indicators for 'sensitivity and 'adaptive capacity'. Without going into the details of these indicators, this new model with updated indicators is considered by some authors as practically more useful: one of the advantages is that it considers a system in anticipation of hazard, thereby enlarging the scope for reducing vulnerability to both, before and after the hazard occurrence (Sharma & Ravindranath 2019). For a technical overview of 'exposure' and 'vulnerability' as the determinants of risk, see Cardona et al. 2012.

<sup>4</sup> See: [https://www.ipcc-data.org/guidelines/pages/glossary/glossary\\_e.html](https://www.ipcc-data.org/guidelines/pages/glossary/glossary_e.html).



# Climate vulnerability assessment of Tunisia's agri-food system

## Climate impacts and climate variability so far

Tunisia is considered to be one of the countries most exposed to climate change in the Mediterranean. This is due to the location of Tunisia, positioned between the inter-tropical regions and the temperate regions of the northern hemisphere, which makes its climate particularly variable (Amamou et al. 2018). Generally, the main impacts that are already being felt include temperature increases, reduced precipitation, rising sea levels and escalating extreme weather phenomena such as floods and droughts. According to the country index of the Notre Dame Global Adaptation Initiative, developed by the US-based University of Notre Dame, Tunisia ranked 64th out of 181 countries. This index looks at a country's vulnerability to climate change and other challenges in combination with its readiness to improve resilience.<sup>5</sup> On a global scale, relative to other countries, Tunisia's current vulnerability is still manageable, but adaptive capacity or readiness - the country's ability to leverage investments and convert them into adaptation actions - needs to improve for better adaptation, as will be further discussed in this research paper.

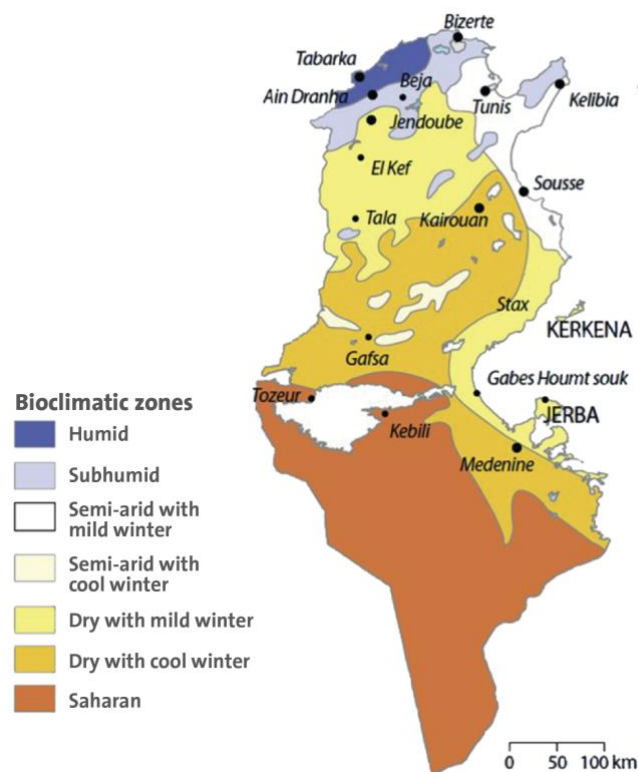
Tunisia's susceptibility to climate variability and change is strongly tied to its reliance on the agricultural sector that accounts for 10 to 14 percent of the country's GDP and employs approximately 16 percent of the workforce (USAID 2018).<sup>6</sup> Tunisia covers approximately 16 million hectares. This total area consists of 30 percent arable land and 27 percent pasture and forests, while the remaining land is not suitable for agriculture (OECD/FAO 2018). Ninety-three percent of the cropland is dedicated to rainfed agriculture, so production is largely dependent on rain (Verner et al. 2018). The sector uses approximately 80 percent of the country's water supply, which is especially problematic as Tunisia has scarce water resources, well below the average water availability of other countries in the region of the Middle East and North Africa (MENA).<sup>7</sup> Other stressors to agriculture include rising temperatures, sea-level rise leading to saline intrusion and precipitation change, leading to flooding. These risks have already caused decreases in crop yields, shifts in growing seasons, degradation of soil quality and productivity, increased salinisation of aquifers, and decreased availability of water for irrigation (USAID 2018; Ministry of Local Affairs and Environment 2014).

---

<sup>5</sup> See: <http://gain.nd.edu/>.

<sup>6</sup> Tourism is the second biggest sector, prone to climate impacts, as it accounts for 6.5 percent of GDP and supports 6 percent of Tunisia's workforce (USAID, 2018).

<sup>7</sup> The national per capita sustainable water availability is roughly 400 cubic meters per year - below both the average for the MENA region (1250 cubic meters per year) and the United Nations (UN) threshold for classifying regions as water scarce (1000 meters per year) (Verner 2013; Verner et al. 2018).

**Figure 1. Map of Tunisia's bioclimatic zones (You et al. 2016)**

Tunisia has three distinct and contrasting climate zones, prone to different climate risks: a northern Mediterranean climate zone, a central steppe climate zone, and a southern desert climate zone. The Centre and the South of the country are vulnerable to climate impacts such as increases in annual temperatures and significant reductions in annual rainfall. In the northern region, a rise in sea levels is already threatening increased erosion, flooding and salinization of aquifers in coastal areas (You et al. 2012; Verner et al. 2018; USAID 2018).

## Projected climate impacts on agricultural productivity

Scientific reports and analysis, including Tunisia's Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), suggest a hotter, drier and less predictable climate with increasing temperature, declining rainfall and water availability and more intense and frequent extreme weather events (floods and droughts) over the century (Ministry of Local Affairs and Environment 2014). IPCC projections also predict higher risks of droughts throughout the 21st century under high-end greenhouse gas emission scenarios (IPCC 2013, cited by Verner et al 2018).

This rainfall dependency, especially under climate change, will severely threaten agriculture in Tunisia. According to USAID projections, Tunisia's economy will suffer a reduced output of 2-2.7 billion USD between 2000 and 2030 due to the combined effects of increasing global food prices and stagnant agricultural yields (USAID 2018). From an agricultural perspective, future climate risks to the sector include the decrease in crop yields, a shift in growing seasons, the degradation of soil quality, increased salinisation of aquifers, the decreased availability of water for irrigation and higher food prices. Climate risks will have a particularly negative impact on crop

yields of wheat, barley, and irrigated potatoes, and eventually food security. Dryness and impaired soil health will also negatively impact fruit and olive oil production. Moreover, crop choices and production methods are not always adjusted to environmental conditions. For instance, crops such as wheat are grown in areas with insufficient water availability. With climate variability and climate change leading to more severe droughts, there will not be enough surface water to meet farmer's irrigation needs, especially in the arid zones of the country. As a result, farmers will have to increasingly rely on groundwater, which, in turn, will intensify pressure on already stressed aquifers. Also, reduced water availability may force agri-food actors to make crop choices with important trade-offs. For instance, in the central and southern regions, agri-food actors may be forced to choose between irrigating olive trees, key to Tunisian exports, or wheat fields, important for self-sufficiency (USAID 2018; FAO 2017; Verner et al. 2018).<sup>8</sup> Box 1 takes a closer look at the vulnerability of the wheat sector, a key crop for Tunisia's agri-food system: together with olives and tomatoes, it is one of the top three main crops produced annually.

---

### Box 1. The vulnerability of the wheat sector

Cereals, including wheat, cover 1.5 million hectares on average, representing one-third of the cultivated area (FAO 2017). Tunisia's wheat production is predominantly in the North and the Centre, where cultivation conditions, such as rainfall, are more favourable than in the South. According to the Water Footprint Assessment Tool, developed by the Institute of Environmental Security, the wheat sector uses 21 percent of water from precipitation.<sup>9</sup> Irrigated wheat fields represent less than 15 percent of the total wheat crops planted. So, the majority of Tunisia's wheat production still depends entirely on rainfall that varies annually in quantity and timing.<sup>10</sup> In the past decades, droughts have led to poor harvests and depressed grain production in Tunisia, especially in the Centre and the South of the country (Verner et al. 2018). Farmers have often responded to agricultural drought by increasingly exploiting groundwater for irrigation that is already in scarce supply. As the future seems set to bring increasing water scarcity, more frequent and severe droughts, and variable precipitation patterns, the trend of unsustainable water exploitation, is expected to worsen (USAID 2018; Verner 2018). Climate scenarios predict a 20 percent reduction by 2030 in the cereal production surface area in the southern region (Verner 2013; Verner et al. 2018). Furthermore, Tunisia's wheat-growing season may shrink by two weeks if temperatures rise by 2 degrees and by about a month if they rise by 4 degrees (EJF 2017). This yield gap, expected to grow due to increasingly difficult natural rain resources, calls for the need to improve production methods and technical assistance to improve agronomic practices, such as more diversification of farming activities and the introduction of drought-resistant wheat varieties. An option could be to introduce more barley that has lower water requirements, compared to wheat. Another common option would be to apply organic fertiliser that has better water retention properties. However, other than subsidy and price supports, support to the wheat sector has been neglected in Tunisia. For example, extension services have been reduced in many areas in Tunisia (Verner et al. 2018; OECD/FAO 2018).

At the same time, Tunisia is highly dependent on food imports: between 2009 and 2017, the country's cereal import dependency was approximately 63 percent.<sup>11</sup> More than half of the imported cereals are wheat, sourced mostly from Ukraine (more than 40 percent in 2018), and to a lesser extent from France, the USA, Spain and Russia, respectively.<sup>12</sup> In 2010, Tunisia ranked sixth in the list of the world's most important wheat-importing countries (EJF 2017). According to the Observatory of Economic Complexity, Tunisia imported food-related goods to the tune of more than 2.1 billion EUR in 2017. Global climate

---

<sup>8</sup> Interview with Director of *Syndicat des agriculteurs de Tunisie* (SYNAGRI), Skype interview, 2 February 2021.

<sup>9</sup> See: <https://www.envirosecurity.org/latest-news/new-water-footprint-assessment-tool-is-online>.

<sup>10</sup> It is estimated that only 25 percent of the wheat area within the irrigation perimeter actually uses irrigation, due to a number of reasons, including costs, time, water availability or inadequate pumping facilities (Verner et al. 2018).

<sup>11</sup> See: [www.fao.org/faostat](http://www.fao.org/faostat).

<sup>12</sup> See: <http://www.fao.org/giews/countrybrief/country.jsp?code=TUN&lang=ar>.

change's major impact channel is through changing world food prices, in combination with global population growth and changing food consumption patterns (Nelson et al. 2010). World food prices are expected to increase under climate change and local climate impacts will manifest themselves through long-term yield changes. Yields for wheat are expected to fall, due to climate impacts and other factors.<sup>13</sup> This makes Tunisia vulnerable to shocks such as fluctuating international prices that could negatively impact food security, particularly in light of declining foreign exchange reserves (Kwasi et al. 2020).

---

Box 2 describes the vulnerability of Tunisia's olives sector. With olive oil being one of Tunisia's main export products, it is a key sector for the country's GDP growth.

---

### Box 2. The vulnerability of the olives sector

The olives sector is of key importance to Tunisia's socio-economic development as the country is one of the world's largest producers and exporters of olive oil. The sector employs 390 000 of the country's 560 000 agricultural workers and provides revenue for about one million Tunisians. According to figures from 2016, Tunisian olive groves cover 1.672 million hectares. Olive trees are present in all regions of Tunisia. In the North and in the Centre, they are largely grown in diversified systems with other crops, such as citrus fruits or almonds. Central Tunisia represents about 65 percent of the olive-growing area. In the South, they are exclusively grown in monoculture systems (Chebbi et al. 2019; FAO 2015).

Olive oil is the country's biggest agricultural export product, as about 90 percent of Tunisian olive oil is produced for export, making up approximately 50 percent of food-related exports. The majority of olive oil is exported to the EU: in 2017, it represented 53 percent of Tunisian olive oil exports. The rest of the export goes to the United States, Canada and Morocco. While the EU is Tunisia's main offset market for processed olive oil, there are also several commercial and market access challenges for Tunisia. These issues are linked to vested interests in Europe, particularly Spain and Italy, Tunisia's main sales markets for olive oil. The exported olive oil is often repackaged as 'Italian or Spanish olive oil', resulting in these countries promoting their own geographic appellations and branding and keeping the value addition in the hands of South European countries, while limiting European consumer awareness on Tunisian olive oil.<sup>14</sup> Besides, the EU has not offered sufficient guarantees for Tunisian processed oil in terms of access to its market, while also setting strict quotas. Therefore, on the one hand, the EU's development cooperation has supported Tunisia's olive oil sector, but on the other hand, trade policies allow only for a subordinated integration into the European market. The process of the DCFTA negotiations between the EU and Tunisia should therefore create better market access for Tunisian olive oil (e.g., higher quota) and allow for the implementation of a strategic upgrading policy for the olive oil sector (Grumiller et al. 2018; Oxfam 2020; FAO 2015).

The olives sector is already and will continue to be impacted by climate change, as production is reliant on rainfall (FAO 2015). According to the Water Footprint Assessment Tool, developed by the Institute of Environmental Security, olive production requires 49 percent of rainwater.<sup>15</sup> Olive arboriculture thus depends greatly on rainfall availability and is susceptible to drought. For instance, due to severe drought in 2016, olive production declined by 28 percent and oil mills functioned at only 40 percent of their capacity (Chebbi et al. 2019; Verner et al. 2018). Climate scenarios predict a 50 percent reduction by 2030 in olive oil production nationally, because of droughts.<sup>16</sup> An effective adaptation measure would be to introduce drought-tolerant olive tree species, especially in the South of Tunisia, where drought will be particularly harsh (Ben Zaied & O. Zouabi. 2016; FAO 2015).

---

<sup>13</sup> See: <http://www.yieldgap.org/>.

<sup>14</sup> See: <https://www.lemanager.tn/2020/01/17/hausse-du-quota-dexportation-de-lhuile-dolive-lunion-europeenne-dit-encore-non-a-la-tunisie/>.

<sup>15</sup> See: <https://www.envirosecurity.org/latest-news/new-water-footprint-assessment-tool-is-online>.

<sup>16</sup> See: <https://www.middleeasteye.net/news/tunisias-olive-production-could-halve-2030-due-climate-change>.

# Three climate-related development risks

In addition to the climate risks for Tunisia, particularly in the agri-food sector, this section discusses three sets of socio-economic, governance and political pressures that constitute climate-related development risks and can cause instability. These risks increase Tunisia's exposure and sensitivity to climate risks and reduce the country's adaptive capacity. They need to be tackled to better adapt Tunisia's agricultural sector to climate impacts and, ultimately, to avoid cascading climate risks for neighbouring countries and the EU. The three types of climate-related development risks do not exclude other potential pathways, nor do they operate separately from each other.

## Governance and policy coherence challenges

The first strand of climate-related development risk relates to the governance system, characterised by fragile and divided government coalitions, the prevalence of a rent-economy and related particular interest groups, the State's financial constraints, a weak institutional set-up for climate action, limited decentralisation and empowerment of local authorities, all contributing to the incoherence of climate policies in Tunisia.

According to the Mo Ibrahim Foundation's 2020 Index of African Governance, Tunisia is "*relatively well-governed*", ranking fourth in Africa (17 November 2020). This can be explained by significant improvements regarding public participation and democracy since the 2011 revolution. Civil society actors as well as a dynamic informal movement have played a key role in the country's democratic transition, constitutionalising various principles related to affirmative action and broadening the rights to include access to education, health care and water (Loewe et al. 2020).<sup>17</sup> Civil society organizations (CSOs), together with critical media and academic institutions, have also played an increasingly strong role in the domain of environment and climate change (Meddeb 2020).<sup>18</sup> They have been quite successful in raising awareness on climate change, mainly in the urban areas within the higher educated circles (USAID 2018).<sup>19</sup> However, overall, the success of the work of environmental CSOs is limited in marginalised, rural areas of the country, where climate impacts will be felt more strongly, as agricultural production is declining in the face of climate change. One of the reasons is the fragmented approach among CSOs.<sup>20</sup> On top of that, civil society together with communities and activists, are confronted with various factors and actors resisting more coherent, sustainable and inclusive policies.

<sup>17</sup> At the time of the revolution, Al Jazeera English reported that Tunisian activists are among the most outspoken in its part of the world, especially via social media. See: <https://www.aljazeera.com/news/2010/12/20/riots-reported-in-tunisian-city>.

<sup>18</sup> Tunisia is known for online environmental activism, such as documentary films or blogging platforms, circulated via alternative media channels. Interview with Geographer/Filmmaker/Founding member of *Observatoire de la Souveraineté Alimentaire et de l'Environnement*, Skype interview, 6 October 2020.

<sup>19</sup> Interview with representatives from WWF Tunisia, Skype interview, 17 January 2020.

<sup>20</sup> Interview with GIZ representative based in Tunis, Skype interview, 17 December 2020.

According to the Arab Barometer (2019), the majority (68 percent) of Tunisian citizens see climate change as a cause of concern.<sup>21</sup> However, critical voices blame the Government for its *“political silence, despite the climate urgency of the country”*.<sup>22</sup> Clearly, there is a general lack of political will or capacity to see through implementation of commitments and policies, as discussed in Box 3.

---

### Box 3. Overview and assessment of climate-related policies, strategies and institutions in Tunisia

When it comes to developing policies and strategies in favour of environmental protectionism and climate action, Tunisia is ahead of most MENA region countries. Under the rule of former dictator Ben Ali, Tunisia ratified several international conventions on matters of environmental protection (Rousselin 2018). It was the first North African country to formally ratify the United Nations Framework Convention on Climate Change (UNFCCC) in 1993 and the Kyoto Protocol in 2002. Since then, the country has integrated environment and climate change into various national policies. It also prepared two National Communications to the UNFCCC (2001, 2014) and ratified the Paris agreement in 2017 that entered into force during the same year (UNFCCC, 2015). These policies and communications are often pushed by civil society or international organisations, working closely with the Government.

Following the political changes triggered by the Tunisian revolution, Tunisia adopted a new Constitution in 2014 that incorporated the fight against climate change as a permanent feature. Under Article 44 of the new Constitution, the State shall *“provide the means necessary to guarantee a healthy and balanced environment and contribute to the climate’s integrity”*.<sup>23</sup> This gives Tunisian courts the means to adopt pioneering environmental jurisprudence. In 2012, Tunisia launched its National Climate Change Strategy, developed by the Ministry of Local Affairs and Environment. It includes both adaptation and mitigation targets to reduce the economy’s carbon emissions. Also, it calls for better institutional arrangements that allow cross-sectoral interactions and better linkages between national and sub-national levels of government to tackle climate change.<sup>24</sup>

The climate response in Tunisia has been emphasised in the energy sector with a strong focus on energy management and a shift towards low-energy practices. Also, in the country’s Nationally Determined Contribution (NDC), submitted to the UNFCCC in 2017,<sup>25</sup> the policy of fighting climate change is particularly emphasised in the energy sector through mitigation actions: Tunisia proposes to lower its carbon intensity, including in industrial processes and the agriculture sector, by 41 percent in 2030, relative to the base year 2010. The implementation of the Tunisian mitigation measures requires an estimated 18 billion US dollars to cover investment needs and to finance capacity-building programmes. For adaptation, Tunisia has planned activities in four sectors: water resources, agriculture, coastline and tourism. In the agriculture sector, the planned actions are essentially capacity building and institutional development measures, for instance by adapting irrigated crops in the central region or adapting mixed farming-livestock production to climate change in vulnerable areas. The additional costs of the necessary adaptation measures will be approximately 2 billion dollars. Tunisia is appealing for support from the international community to cover all the adaptation costs (UNFCCC 2015; AfDB 2019). In fact, out of 44 reviewed African NDCs, Tunisia is only one of three countries that has not provided any figure for its domestic financial adaptation needs, but only for external assistance required (AfDB 2018), which is worrisome in terms of ‘ownership’ of the adaptation response. However, externally funded adaptation activities may become a challenge as this area has been quite weak so far. According to AidAtlas, in the period 2010-2018, out of the total development finance to Tunisia from

---

<sup>21</sup> See: <https://www.arabbarometer.org/2020/04/climate-change-a-tertiary-concern-for-arab-citizens/>.

<sup>22</sup> See: <https://www.leconomistemaghreb.com/2019/12/09/tunisie-urgence-climatique-et-silence-politique/>.

<sup>23</sup> See: [https://www.constituteproject.org/constitution/Tunisia\\_2014.pdf](https://www.constituteproject.org/constitution/Tunisia_2014.pdf).

<sup>24</sup> See: <http://www.environnement.gov.tn/index.php/fr/?id=190&L=1%23.Wwee2kiFOhM;>  
<http://www.environnement.gov.tn/PICC/wp-content/uploads/Strat%C3%A9gie-Nationale-%E2%80%93-Synth%C3%A8se.pdf>.

<sup>25</sup> Tunisia’s NDC will be updated by September 2021 ahead of COP26. Correspondence with representatives from WWF Tunisia (e-mail), 22 January 2021.

all funders (a total commitment of 24.9 billion USD), 68.9 percent targeted mitigation activities, 27.1 percent was targeted at adaptation activities, while 4.1 percent targeted mitigation and adaptation simultaneously. The largest amounts of adaptation funding came from France, Germany and the African Development Bank respectively.<sup>26</sup> Lastly, in 2018, Tunisia launched the process to develop its National Adaptation Strategy, but this has not been finalised at the time of writing.<sup>27</sup>

The institutional set-up for climate action within Tunisia further limits an adequate response to climate risks. Institutionally, all climate activities are under the Ministry of Local Affairs and the Environment that coordinates between the focal point at the UNFCCC, the focal point of the Green Climate Fund and the National Consultative Committee on Climate Change Adaptation, bringing together all the representatives of organisations (public and private) and ministries involved in climate action.<sup>28</sup> So far, climate action is not being mainstreamed throughout all line ministries.<sup>29</sup> The Ministry of Agriculture, Water Resources and Fisheries is the only ministry that houses a Focal Point for Climate Change. But this Ministry is being criticised for its inability to provide a robust agricultural development vision for Tunisia's agri-food system while ensuring the sustainable use of water and soil resources.<sup>30</sup>

In Tunisia, it remains difficult to implement country-wide aspirational policies as macro-level policies often do not translate into positive action at the micro-level (Rousselin 2018). Implementation of the climate policies, especially in the domain of adaptation, will be difficult: Tunisia faces numerous technical, financial, and institutional challenges to do so. Also, significant policy incoherence has led to a fragmented climate approach. The country's development plan for the period 2016-2020 is based on five axes of reform. One of these is 'green economy, pillar of sustainable development'.<sup>31</sup> However, while the country has many sectoral and short-term plans, as listed above, it still lacks a clear and concrete orientation that allows for coordination between different policies. The country also fails to adopt a territorial approach to climate change that recognises the diversity of the various regions and ensures that there are capacity and resources at the local level to effectively adapt to climate impacts and build resilience.<sup>32</sup> In addition, some sectoral policies may have negative repercussions for Tunisia's society, as they lack inclusivity. As mentioned, Tunisia's climate policies pay strong attention to 'mitigation', thereby opening the door to (foreign) investments in the energy sector (smart grids, solar energy, green hydrogen, etc). However, critical voices claim that energy from cheap natural resources, including solar energy, is flowing from Tunisia to Western Europe while depriving Tunisians of their energy.<sup>33</sup>

Historically, the government has not focused on climate change as a policy priority. A telling example is the orientation of Tunisia's extractives industry: for many years, the government was solely occupied with growth and enriching the inner circles within a hard security-oriented regime, to the detriment of the environment (as was also the case in other sectors such as the manufacturing industry). This has given way to predatory politics, strongly in favour of phosphate, gas and oil extraction, that are fuelled by rising global demand for these extractives. Box 4 takes a closer look at the phosphate sector and its detrimental effects.

<sup>26</sup> See: [www.aid-atlas.org](http://www.aid-atlas.org). The disbursement ratio for development finance to Tunisia targeting Climate Change over this period was 43.4 percent.

<sup>27</sup> See: <https://www.webmanagercenter.com/2018/08/17/423381/la-tunisie-lance-son-plan-national-dadaptation-aux-changements-climatiques-pour-la-securite-alimentaire>.

<sup>28</sup> See: <http://www.environnement.gov.tn/index.php/fr/environnement-en-tunisie/les-changements-climatiques/engagements-et-priorites-de-la-tunisie-en-vertu-de-l-accord-de-paris-sur-le-climat>. There exists also a National Consultative Committee that focuses on the reduction of greenhouse gas emissions.

<sup>29</sup> Interview with GIZ representative based in Tunis, Skype interview, 7 December 2020.

<sup>30</sup> Interview with Director of *Syndicat des agriculteurs de Tunisie* (SYNAGRI), Skype interview, 2 February 2021.

<sup>31</sup> See: [https://www.leaders.com.tn/uploads/FCK\\_files/Presentation\\_Note\\_Orientation\\_%20FR\\_VF.pdf](https://www.leaders.com.tn/uploads/FCK_files/Presentation_Note_Orientation_%20FR_VF.pdf). For the regional components of the Development Strategy, see: <http://cgdr.nat.tn/fr/index.php?srub=352&art=587>.

<sup>32</sup> Interview with Director of *Syndicat des agriculteurs de Tunisie* (SYNAGRI), Skype interview, 2 February 2021.

<sup>33</sup> See: <https://www.opendemocracy.net/en/north-africa-west-asia/another-case-of-energy-colonialism-tunisia-s-tunur-solar-pro/>.

---

#### Box 4. Tunisia's phosphate sector: an example of governance as a limit to sustainability

Tunisia is one of the world's top-ten producers of phosphate, a product used as a key ingredient for agricultural fertiliser. But according to the Resource Governance Index, developed by the National Resource Governance Institute, the sector scores only 46 out of 100 points in the 2017 ranking.<sup>34</sup> The phosphate sector is led by the state-owned Compagnie de Phosphate de Gafsa. Transparency around the company's operations has slightly increased, but it does not disclose financial information such as cash flow statements. Moreover, the mining code does not require disclosure of environment and social impact assessments. To tackle claims of non-transparency, Tunisia is in the process of accessing the Extractive Industries Transparency Initiative, an international initiative working towards transparency in the management of natural resources, through the full disclosure of the income. But the lack of progress in this candidacy procedure remains a challenge.<sup>35</sup> Furthermore, the activities of the phosphate sector have serious social and ecological consequences in the poorest regions of the country. Despite promises by the sector, local job creation has been limited. While the mining code sets procedures for project rehabilitation and compensation mechanisms for affected landowners, compliance with these requirements is very weak. In addition, the sector has destroyed traditional economic sectors such as farming, leading to environmental degradation and causing serious pollution, especially in Gafsa, the main phosphate-producing area. Extraction has also caused health problems, while there has been insufficient provision of public services and health infrastructure (Rousselin 2018; Ghilès & Woertz 2018).

---

This multi-layered injustice, caused by social, health and ecological factors, was one of the factors that led to a protest movement that started a few years before the 2011 Tunisian revolution, in Tunisia named the 'Freedom and Dignity Revolution'<sup>36</sup> and in western media known as the 'Jasmine Revolution' that triggered the 'Arab Spring' uprising.<sup>37</sup> This was only the beginning of a long series of social and environmental struggles fought by workers without centralised union control.<sup>38</sup>

Governance in Tunisia has become more inclusive since the revolution, but not more effective. As a result, human and economic development has stagnated to a large extent.<sup>39</sup> The political system is now more competitive than before the revolution, but it continues to have strong features of clientelism, reflecting the rent-economy in place benefitting particular insiders and interest groups. In this system, there is thus a continuation of the proximity between political and economic elites which in turn plays in favour of the status quo and the defence of interests linked to monopolies. At the same time, this more competitive political stage means that political elites have to worry about short-term political survival and may not have become more inclined than in the past to foster public goods in the long term.

Clearly, this policy environment - that offers a fertile ground for cronyism - affects the ability of the state to address climate risks in several ways and to successfully adapt to climate impacts. Other related factors that further contribute to weak climate policy implementation are the lack of credible national and sectoral policies,

---

<sup>34</sup> See: [www.resourcegovernanceindex.org](http://www.resourcegovernanceindex.org).

<sup>35</sup> See: <https://eti.org/>; [www.resourcegovernanceindex.org](http://www.resourcegovernanceindex.org).

<sup>36</sup> See: <https://blogs.imf.org/2012/02/02/hope-and-perseverance-on-tunisia-demanding-road-ahead/>.

<sup>37</sup> See: <https://news.gnet.tn/tout-savoir-sur-les-ressources-energetiques-et-minieres-de-la-tunisie/>.

<sup>38</sup> See: <https://www.reuters.com/article/us-tunisia-protests/tunisia-phosphate-exports-halted-by-job-protests-idUSKCN1G01XP>. These protests have contributed to decaying productivity of the phosphate sector. See: <https://www.webdo.tn/2019/01/19/la-baisse-de-la-production-de-phosphate-a-fait-perdre-a-la-tunisie-1-milliard-de-dollars-par-an/#.YBwPU-IKhTY>.

<sup>39</sup> See: <http://iiag.online>.



the lack of incentives (including financial incentives), the weakened capacity of public administration, the excessive centralisation, hierarchy, and the lack of effective decentralisation and empowerment of local authorities (World Bank 2014a; Medded 2020; Loewe et al. 2020; Byiers et al. 2021). As a result, the capacity and power of local authorities, who are crucial players to ensure adequate implementation of (locally-led) adaptation responses, is limited, as discussed in more detail below.

The current political system is also characterised by the unsustainability of the state budget: Tunisia has an enormous state deficit with mounting public debt, recently worsened by the COVID-19 crisis, leading to a higher reliance on loans from the International Monetary Fund and a mounting pressure for austerity. The country also has a considerably high unemployment rate (16,2 percent in 2020), especially among the youth, aged 15 to 24 (36,5 percent of the total labour force in 2020).<sup>40</sup> These financial challenges take away attention from investments in public goods or climate action that is, after all, characterised by uncertainty. In addition, there is increasingly widespread corruption, weak tax compliance, the proliferation of the informal sector, smuggling, and general neglect of peripheral areas, as further discussed below (Meddeb 2020; Adly & Meddeb 2017).

## Food import dependency and an export-oriented agri-food system

The second climate-related development risk is based on the country's high food import dependency (particularly wheat imports), exposing it to international food price shocks potentially caused by climate impacts; a lack of national food self-sufficiency; and, a national market and trade system strongly geared towards the export of agricultural goods (particularly olive oil) for which monoculture farming systems have been set up that deplete natural resources and cause soil degradation.

The olives and the cereals sectors are both of paramount importance to Tunisia's economy. But there exists a dichotomy between both: while Tunisia exports its olives, essentially in the form of olive oil, to serve international markets, it imports the bulk of its staple food, notably wheat and other cereals. This agri-food system, characterised by monoculture (olives), food dependency and a lack of investments in national food production (wheat) makes Tunisia even more vulnerable to climate risks, including spill-over effects of climate impacts in third countries. For instance, droughts in wheat exporting countries, can lead to reduced yields and subsequent food price shocks for Tunisia. In this section, we take a closer look at Tunisia's agri-food system, illustrated by the wheat and olives sectors, and explain its unsustainability.<sup>41</sup>

First, Tunisia is one of the world's leading wheat importing countries. Between 2009 and 2017, the country had a cereal import dependency ratio between 57.5 percent and 71.1 percent.<sup>42</sup> As explained earlier, a high-level of cereal import dependency can make lower-income countries, like Tunisia, more exposed to transnational

<sup>40</sup> See: <https://data.worldbank.org/>; statistics are based on data from the International Labour Organisation (2020).

<sup>41</sup> Another aspect of the unsustainability of Tunisia's food system is the high degree of food loss and waste: it loses more than one-fifth of all of its crops, which is higher than other MENA countries. And, approximately 900 000 units of bread, the staple food in Tunisia, are wasted per day, amounting to roughly 50.8 million EUR annually (Kwasi et al. 2020).

<sup>42</sup> See: <http://www.fao.org/faostat/en/#home>.

climate impacts, causing disruptions in the availability, price or quality of food products. Unlike other high cereal import-dependent countries like New Zealand or the Netherlands, a lower-middle-income country like Tunisia has limited agricultural capacity to produce wheat or to buy wheat on the international market at a higher price. In turn, this reduces Tunisia's ability to absorb price shocks (Benzie et al. 2016).<sup>43</sup> Moreover, in 2018, more than 40 percent of cereal imports came from Ukraine (followed by less than 15 percent from France), making Tunisia highly dependent on one provider.<sup>44</sup> Yet, despite Tunisia's high import dependency rate, changes in international grain prices have so far not fully translated into changes in domestic prices as the Government's long-standing tradition of subsidising food keeps prices of wheat products and vegetable oil stable.<sup>45</sup> For many years, the prevailing practice was to 'buy social peace' by subsidising food, especially wheat, to counter recurrent shocks and maintain political stability. However, food subsidies are not sustainable, as they widen the budget deficit, to the detriment of investment in wider public goods. In addition, they have not been sufficiently targeted to the people most in need. This makes this sector very vulnerable from a socio-economic perspective. A key challenge in the years to come is to reform the subsidies without exacerbating social grievances (Newman, 2018; Kwasi et al. 2020).

Since 2008, the government has formulated several new socio-economic strategies to address agricultural production and food security, including a cereal production strategy, as key pillars of the economy. To reduce food import dependency, the Government's goal is to achieve self-sufficiency by providing extension services and loans to cereal producers, and so forth (FAO 2017; OECD/FAO 2018).<sup>46</sup> This general lack of food sovereignty in Tunisia has led to the creation of the *Observatoire de la Souveraineté Alimentaire et de l'Environnement* (OSAE),<sup>47</sup> a non-governmental organisation that focuses on promoting food sovereignty, positive environmental and inclusive transformation with a strong focus on small-scale farmers. OSAE believes that producers should have the right to be protected from low-cost imports and to decide their own food production, without being controlled by the agri-food industry.<sup>48</sup> Currently, more than sixty percent of Tunisia's national wheat is produced by smallholders, who have less than 10 ha of land (Verner et al. 2018). Furthermore, households' food expenditure is high: 36 percent of total household consumption is spent on food and the spending on cereals represents about 13 percent of food expenses. The OSAE reports that one out of two Tunisians consumes

<sup>43</sup> See: <https://www.americansecurityproject.org/qatars-renewable-energy-solution-to-middle-east-food-security-problem/>.

<sup>44</sup> See: <https://tradedatastatistics.io/>.

<sup>45</sup> See: <http://www.fao.org/gjnews/countrybrief/country.jsp?code=TUN&lang=ar>.

<sup>46</sup> Tunisia is one of the few African countries that is self-sufficient in dairy products, vegetables and fruit (Kwasi et al. 2020).

<sup>47</sup> See: <https://osae-marsad.org>.

<sup>48</sup> The concept of food sovereignty gained increased global attention around the time of the 2007–2008 international food crisis, as countries sought to buffer themselves from volatility on world food markets (of course, the narrative that local markets are inherently less volatile is misplaced) (Dekeyser et al. 2018). Over the years, the concept of 'food sovereignty' evolved from debates in favour of food self-sufficiency to criticism of large-scale, industrial agriculture (Chiafetz & Jagger 2014). Food sovereignty and the criticism of large-scale industrial agri-food systems, with a lower dependency on imports to maximise autonomy, is often presented in policy circles as the direct opposite of international food trade (Clapp 2017). However, although yield gap closure and food loss reductions could favour more local food systems, particularly in Africa and Asia, global supply chains would still be needed to ensure an adequate and stable food supply (Kinnunen et al. 2020). This accounts for Tunisia as well, where a food sovereignty approach cannot ignore the contributions that international food markets and modern agriculture techniques provide. However, the approach should allow for better power balance, striving for a larger and more inclusive local autonomy in food production, by reducing dependency on imports in combination with a more socially, economically and ecologically sustainable export model of agricultural goods.

imported food and that food dependence exceeded 55 percent of consumption in 2019. According to the Nomura Food Vulnerability Index, Tunisia has a considerably high level of 'food vulnerability', scoring 18th out of eighty countries (with #1 being the most food vulnerable country). This index is calculated based on three variables: nominal GDP per capita in USD at market exchange rates; the share of food in total household consumption; and, net food exports as a percentage of GDP (-1.1 percent in the case of Tunisia).<sup>49</sup>

Second, olive oil is the country's key export commodity. It creates considerable job opportunities, as nearly a million Tunisians derive (part of) their income from olive growing (Chebbi et al. 2019). The olives sector is strongly in the hands of big companies that, aided by the state, worked towards higher production levels via mechanisation and intensive growth. However, the mechanisation of large-scale capitalist farms has come at the cost of smallholders' dispossession and debt (Bayat 2017).<sup>50</sup> While many small- and medium-sized olive farmers used to have various sources of income, most of them now only harvest olives. On top of that, the current business environment does not provide good access to financial capital, including loans and credits to smallholder producers (Chebbi et al. 2019). Lastly, mass production for export is draining the land, exhausting the soil of nutrients and reducing its fertility, and water availability (ben Khelifa 2020). In recent years, a new type of Spanish olive tree varieties has been introduced in certain areas in Tunisia. While they produce more yields, they will require increasing amounts of irrigated groundwater that will put extreme pressure on already overpumped aquifers.<sup>51</sup> Due to reduced water availability and increased droughts, yields from olive trees will further diminish in the near future, as mentioned earlier.

The EU is Tunisia's largest trading partner, accounting for 64 percent of its trade in 2017: 78,5 percent of Tunisia's exports went to the EU, and 54,3 percent of Tunisia's imports came from the EU.<sup>52</sup> Negotiations for a Deep and Comprehensive Free Trade Agreement (DCFTA), covering a wide range of issues including agriculture, services and sustainable development, have started in 2015. At the time of writing, the negotiations have not concluded. The DCFTA could offer opportunities for more trade, and potentially overall economic growth in Tunisia, and the improvement of non-tariff measures that strongly affect the agricultural sector, including environmental standards and labour rights. However, it could also present risks to the sustainability and profitability of the agricultural sector and it is especially for these reasons that the DCFTA is generally met with strong resistance in Tunisia (Rudloff 2020). Opponents claim that Tunisia's agricultural sector cannot compete with European agriculture systems. According to Riahi and Hamouchene, *"this so-called 'free trade agreement' would promote unfavourable terms of trade for Tunisia, locking the country into an intractable cycle of unending debts, accompanied by harsh conditionalities. [...]"* (Riahi and Hamouchene 2020). Furthermore, with regards to

<sup>49</sup> See: <https://www.nomura.com/europe/resources/pdf/080910.pdf>.

<sup>50</sup> Fifty-four percent of Tunisian farmers have less than five hectares — in all, these farmers share 11 percent of the total area. Yet, those with holdings larger than 50 hectares — a mere 3 percent of farmers — exploit 34 percent of the land area. The structural adjustment programme from the World Bank and the International Monetary Fund that was adopted in the early 1980s has intensified competition between the wealthy areas and the rest of the country over farmland and water. Since that time, large-scale investments in the olives sector were essentially made by Tunisians who ran food processing facilities for olive oil export. These adjustment programmes also meant the erosion of state subsidies to these farmers, further exposing them to market forces (Bush & Ayeb 2014).

<sup>51</sup> See: <https://reporterre.net/En-Tunisie-la-colere-monte-des-champs-asseches-de-Sidi-Bouزيد>; Interview with Director of *Syndicat des agriculteurs de Tunisie* (SYNAGRI), Skype interview, 2 February 2021.

<sup>52</sup> See: <https://ec.europa.eu/trade/policy/countries-and-regions/countries/tunisia/>.

the wheat sector, the heavy import dependency could potentially worsen when Tunisia enters into the DCFTA with the EU, since many Tunisians fear it would remove the remaining barriers protecting the country's agriculture (Rudloff 2020). From an ecological perspective, there could be positive effects as it is expected that production in ecologically fragile and low-yielding areas would be abandoned in response to a loss of profitability. However, it would also result in a loss of employment. Second, concerning the olives sector, the Tunisian-European trade liberalisation could generate more opportunities as it would further open the market (Rudloff 2020; Grumiller et al. 2018). However, it would be important for Tunisia to push for measures such as the expansion of the existing quota for olive oil products and the recognition and protection of geographical indications, discussed above in Box 2. Furthermore, the DCFTA is likely to continue enforcing a system in which the domestic consumption of quality olive oil is further reduced, while the bulk of the produce is being exported. For decades, in Tunisia, the price of substitutes, such as sunflower seed oil, is kept low, while more expansive olive oil has been exported.<sup>53</sup>

## Territorial inequalities

A third climate-related development risk is related to the fact that climate risks are compounded by long-standing inequalities between the interior regions and the affluent coastal areas, marked by declining employment opportunities and diminished agricultural livelihoods in remote areas, despite political promises of more transparent and efficient local governance. This translates into challenges for effective adaptation to climate change that requires strong local responses.

Tunisia is globally known for the country where the revolution started about a decade ago, sparked by the self-immolation of a street vendor in Sidi Bouzid in a secondary city at the centre of the country. His story was emblematic of problems running deeper in Tunisian society that provided the broader context for the uprising: one of long-term social grievances related to corruption and favouritism in government, ineffective public services, regional inequality, unemployment, and a lack of democratic accountability, in particular in rural and provincial areas (Newman 2018; Colombo 2018).<sup>54</sup>

The issue of 'regional inequality' or 'spatial disparity' started to take root in Tunisia since its independence in 1956. In the 1970s, Tunisia pursued economic modernisation, based on the expansion of the tourism sector and low-cost manufacturing that kept the majority of infrastructure investments cordoned off in coastal areas, rather than promoting growth within remote agricultural communities. Today, inland provinces hold 50 percent of Tunisia's oil, gas and water resources; 70 percent of wheat production and 50 percent of olive oil and fruit production. However, despite this rich production, the hinterland remains structurally disadvantaged (Verhoeven 2018; Meddeb 2020). As touched upon earlier in this paper, the long-term negligence of small farmer livelihoods is one of the direct outcomes of policies that reward big landowners and agribusiness (Ayeb 2011; Bush & Ayeb 2014).

<sup>53</sup> Interview with Geographer/Filmmaker/Founding member of *Observatoire de la Souveraineté Alimentaire et de l'Environnement*, Skype interview, 6 October 2020.

<sup>54</sup> On the eve of the revolution, only 18 percent of public investment funds went to the interior regions compared with 82 percent to coastal areas. Today 92 percent of all industry is located near Tunisia's three largest cities on the coast: Tunis, Sfax and Sousse. Together they produce 85 percent of Tunisia GDP (Kherigi 2018).

The Tunisian revolution embarked the country on a path of democratic transition. The 2014 new Constitution dedicated an entire chapter to administrative, political and fiscal decentralisation.<sup>55</sup> In 2018, a new Local Authorities Code was adopted transferring powers to elected local and regional councils, expected to improve local services, drive local development and engage citizens. In the same month, May 2018, the country's first democratic local elections were organised since Ben Ali was ousted.

However, this new locally 'democratic model' is largely a facade. The decentralisation process in Tunisia continues to face structural, logistical and also psychological challenges (Yerkes & Muasher 2018), making progress towards a much-needed integrated, community-led, bottom-up approach to adaptation extremely slow in Tunisia. As aforementioned, the central level, including politicians, sector ministries, civil servants and implementing agencies, are keen on retaining decision-making powers and control over resources. Decades of centralised rule left local authorities with a huge shortage of financial resources. Municipalities received a mere 3.6 percent of the State budget in 2010, compared with an average of 40,4 percent in OECD countries. Furthermore, there is no coherent national vision on decentralised development that integrates the local authorities as full-fledged partners. Their role is generally limited to act as 'passive recipients' of policies and programmes conceived elsewhere, including initiatives by development partners. Moreover, local government is still viewed by many citizens with suspicion as representing the former regime. Consequently, the newly elected local councils will need to bridge the vast gap between local authorities and residents. Taking into account all these political economy conditions, it ought not be surprising that municipal councils lack legitimacy and have been ineffective to meet citizens' urgent needs. Consequently, people in the interior regions have no safety nets to rely upon from their governance systems (Newman 2018; Kherigi 2018; Meddeb 2020). An important reason for that is that Tunisia has a large, low-productivity informal economy and only a small formal sector (Kwasi et al. 2020).

Within this group of disadvantaged people, women face even bigger inequality challenges than men. The 2018 elections did produce a new set of local representatives of which 47 percent were women (Kherigi 2018). However, a significant gender imbalance remains: according to Kwasi et al. (2020), "*progressive social and reproductive health laws in Tunisia have created a false sense of gender equity and self-determination*" (Kwasi et al. 2020). Women are often victims of gender-based violence and they have limited legal support in case of violations.<sup>56</sup> The position of women in rural, marginalised areas is "*extremely problematic*", according to research by Gender Concerns International: "*40 percent of women in rural areas are not well integrated into the economic and political life; they are illiterate and have no access to free healthcare.*"<sup>57</sup> In the olives sector, for instance, 90 percent of harvest workers are women, working as seasonal agricultural labourers. They earn a daily salary that is typically less than their male counterparts, who do the same work.<sup>58</sup> Conservative views on the role of women in Tunisia's society are deeply rooted:

<sup>55</sup> See: <https://science.time.com/2014/01/29/tunisia-recognizes-climate-change-in-its-constitution/>.

<sup>56</sup> See: <https://euromedrights.org/wp-content/uploads/2016/06/Tunisie-violences-femmes.pdf>.

<sup>57</sup> See: <http://www.genderconcerns.org/country-in-focus/tunisia/the-situation-of-women-in-tunisia/>.

<sup>58</sup> See: <https://www.oliveoiltimes.com/world/tunisian-women-producers-making-a-mark-in-a-mans-world/64329>.

illustrative of this is the current President's recent rejection of gender equality in inheritance law.<sup>59</sup>

Unemployment, especially among the educated youth is high, particularly in the rural areas (World Bank 2014b; 2020). As a consequence of the perpetually unkept promises of economic growth, renewed public frustration has led to protests. For instance, in 2015, there were nearly 4500 instances of social protests, including demonstrations and occupations of land, mostly taking place in the interior regions. This number doubled in 2016 and 2017, the number of protests increased to nearly 10 500 instances before decreasing eventually to approximately 9000 in 2019 (Meddeb 2020). Moreover, these continued patterns of regional subordination and the lack of socio-economic opportunities led to general disillusionment. Tunisian youth now are joining jihadi groups in among the largest numbers per capita of any country in the world, and making up the majority of boat-borne migrants to Italy this year.<sup>60</sup>

As aforementioned, an integrated approach to climate impacts is currently missing in Tunisia. This is problematic because it risks further deepening territorial inequalities in the country. The population in these marginalised regions in the South and the centre of the country will be particularly strongly affected by climate impacts as they are more dependent on agriculture and already suffering from a lack of unemployment opportunities. For example, any damage to infrastructure from sea level rise or flooding may increase the socio-economic gap between the coast and the interior regions: in Tunisia, the majority of goods are transported by roads, so any degradation from climate stressors would be detrimental to the economy and rural communities would be the first victims of that as they would have reduced access to goods and services. Also, impacts to or mismanagement of water distribution or supply infrastructure, including water and wastewater treatment and reuse facilities, would pose challenges to remote communities first.

Given this combination of complex political, governance, socio-economic and climatic factors, the challenge is for government policies to take better account of the coming challenges, especially given the political economy context that remains focused on rent-control by political and economic elites.

---

<sup>59</sup> See: <https://thearabweekly.com/tunisian-president-rejects-gender-equality-inheritance>.

<sup>60</sup> See: <https://www.theguardian.com/global-development/2020/dec/16/he-ruined-us-10-years-on-tunisians-curse-man-who-sparked-arab-spring>.

# Looking ahead: implications for Europe

## Potential future scenarios for Tunisia

How countries adapt to climate change will depend heavily on their level of vulnerability, based on a combination of their exposure, sensitivity and adaptive capacity. As explained, a country's adaptive capacity is a reflection of the strengths and weaknesses of existing socio-ecological and political systems and governance structures. How climate risks will affect countries like Tunisia, and which spill-over effects these risks could have on the wider region, and particularly Europe, is a key component of the work being conducted under the CASCADES project throughout 2021-2023.<sup>61</sup> One of the immediate next steps of analysis is to build potential future scenarios, based on a comprehensive assessment of climate risks and opportunities in Tunisia and the wider MENA region across a broad set of climate-sensitive sectors under high- and low-end climate and socio-economic scenarios.

Scenarios project several possible pictures of the future. They tell what could happen within a certain probability space over time. So, they consist of both the situation in the future and the development leading up to that situation, including the present. In recent years, scenario-building has been used extensively to explore the potential effects of socio-economic and environmental change. There exist various techniques to build scenarios, ranging from purely quantitative (i.e. computer simulations) techniques to purely qualitative (i.e. explorative or normative scenario-building) techniques, or hybrid techniques that combine quantitative and qualitative elements in the scenario-building process. Scenario-building serves several purposes, notably risk assessment and management, decision-making and strategy development (Berg et al. 2016; Bressan et al. 2019). The CASCADES scenario-building makes use of a hybrid approach, using quantitative research (i.e. participatory scenario-building) and qualitative (including ISIMIP modelling)<sup>62</sup> techniques.

The CASCADES project resides on a common scenario framework that was developed by the IPCC. Within this IPCC framework, there exist two complementary approaches to building scenario pathways that can examine how global society, demographics and economics might change in the 21st century, looking at three timescales (short- (2030), mid- (2050) and long-term (2100)). These are the Representative Concentration Pathways (RCPs) and the Shared Socioeconomic Pathways (SSPs). First, the RCPs set four different pathways for greenhouse gas concentrations and the amount of global warming that may occur in the future from continued warming. Second, the SSPs present five future pathways, based on socioeconomic factors such as population, economic growth, resource availability, education or urbanisation. These are all factors that define adaptive capacity.<sup>63</sup> As

---

<sup>61</sup> At the time of writing, regional workshops on participatory scenario-building for climate change adaptation are being prepared as part of the work under CASCADES.

<sup>62</sup> See: <https://www.isimip.org/>.

<sup>63</sup> See: <https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change>.

aforementioned, the CASCADES project will also use quantitative methods such as stakeholder engagement techniques. A practical example is the participatory scenario-building process, involving national experts and policy-makers, by the Food and Agriculture Organisation on implications of climate change for agricultural development in Malawi (2012-2040) (FAO 2013).

The climate vulnerability assessment above made clear that Tunisia is highly prone to climate risks in its agri-food system, including its important wheat and olives sectors. Compared to other North African countries such as Algeria or Morocco, Tunisia is expected to be better equipped to adapt for various reasons. However, the previous section spelled out three determining factors that impede the country's adaptive capacity, including weak governance, high cereal import dependency and territorial inequalities. Clearly, a sense of socio-economic frustration prevails in Tunisian society, together with a general dissatisfaction with the inability of democracy to improve governance and livelihoods. In fact, the economic situation in Tunisia worsened since the revolution and large government expenditures, subsidy policies, including food subsidies, and inequitable fiscal policies, have put increasing pressure on the state's budget which has complicated this issue.

On the other hand, there are forces in society that could drive the country towards a more sustainable, resilient and green pathway. Tunisia has significant human capital, including a highly educated and vocal young population with a relatively high 'environmental/climate awareness' and a dynamic civil society. However, given the system of governance described above, with political competition largely focused on rent access, there is no clear development vision and orientation that can drive the allocation of scarce resources (see Box 3 above), it remains unclear when and how the country would set course towards a more resilient and green pathway.

Highly relevant for this study is the work done by Kwasi et al (2020) on three potential development pathways, based on three different potential policy orientations, that Tunisia could follow by 2040. These orientations prioritise economic growth, leapfrogging, and sustainability and growth, respectively.<sup>64</sup>

- The first, growth-oriented scenario simulates a future in which Tunisia prioritises economic growth, disregarding environmental repercussions and implications for inequality. Economic growth would be achieved through investments, the promotion of industrial production and export-led growth. The greater economic freedom would allow for more competition and it would offset the current subsidy policies. This scenario would lead to the highest GDP growth, but due to its lack of environmental integration and inclusion, it would not continue to allow for growth in the long-run.
- The second, leapfrogging scenario shows a country that maximises the use of its human capital and the potential of its information technology, by making strong investments in technology, including renewable energy, and education and promoting the private sector. GDP growth would be considerable, but less high than in the first scenario.

---

<sup>64</sup> As for the methodology, Kwasi et al. (2020) conduct an integrated analysis based on the International Futures modelling platform (IFs) and the Current Path, developed by the Frederick S. Pardee Center for International Futures, University of Denver (See: [www.pardee.du.edu](http://www.pardee.du.edu)).



- Lastly, the sustainability and equality scenario simulates development that promotes environmental stability, better access to basic infrastructure and offers more equal opportunities. GDP growth would be less compared to the first pathway, but more than the second. This sustainability scenario would strongly reduce extreme poverty. This scenario would also have particularly positive repercussions for Tunisia's agricultural sector: it would improve agricultural crop yields by paying attention to better water management and improved irrigation methods while reducing food loss. Importantly, in this scenario, Tunisia would eliminate agricultural import dependency, protecting the country against global food price shocks. As a consequence, Tunisia would be better protected against shocks in international food prices and it could move towards becoming a net exporter. It is the only scenario that would make Tunisia food self-sufficient and in which greenhouse gas emissions would be reduced.

However, all three scenarios would require significant reform, including improved governance, better business regulation and more economic freedom and less corruption (Kwasi et al. 2020). A decade after the 'Freedom and Dignity Revolution', Tunisia finds itself at a crossroads that requires radical but necessary economic and socio-political reforms, if it is to achieve inclusive and sustainable development, while effectively addressing climate risks. However, as the analysis in the previous section shows, the likelihood that Tunisia could embrace radical reforms is small. The current political settlement forms an almost insurmountable barrier to large reforms. How to incrementally make changes to this governance structure, and especially what the role of the EU is in doing so, will be held under scrutiny in the next phases of the CASCADES project.

## Possible repercussions for Europe

The first section of this paper presented a conceptual framework to understand 'cascading climate risks' that can cross systems, sectors and borders. Climate risks will have negative implications for Tunisia's agri-food system that can have spill-over effects to Europe. As aforementioned, these effects could manifest themselves as a direct consequence of climate impacts on Tunisia (e.g. reduced crop yields leading to food insecurity and potential civil unrest) or indirectly, as a result of an adaptation response (e.g. an export ban). In the next phases of the CASCADES project, the focus will be on the potential knock-on effects on socio-economic systems, livelihoods, trade patterns and supply chains between Tunisia and Europe, and the possible policy responses within and across the EU's foreign policy sectors, including development, trade and security, that are traditionally treated separately.

The European stakes in Tunisia are high: Tunisia is of geostrategic importance to the EU. Europe has hailed Tunisia for being 'the poster boy of the revolution' and 'the only real democracy in the region'. The country is seen as Europe's main ally in a volatile region. Tunisia plays an indispensable role as a diplomatic interlocutor with other African countries and is a key actor in the Europe-Africa dialogue (Soler i Lecha 2020). In the period 2010-2018, the EU institutions (excluding the European Investment Bank) provided the largest share of development assistance to Tunisia (4.62 billion USD out of a total commitment of 24.9 billion USD).<sup>65</sup> Therefore, domestic instability in Tunisia would have major negative repercussions for the European neighbourhood. The EU must avoid the negative, spill-over effects through

---

<sup>65</sup> See: aid-atlas.org.

the connections it has with Tunisia through supply chains and trade, migration and so forth.

Both the wheat and the olives sectors are illustrations of the myriad of interconnected factors that can cause direct or indirect threats to Europe. First, the wheat sector in Tunisia faces a two-fold challenge: on the one hand, Tunisia is heavily dependent on imports of which quantity and quality could be impacted by climate change effects in third countries, such as Ukraine from where Tunisia imports the bulk of its cereals. At the same time, it is predicted that national production will decrease due to climate risks. This could cause food insecurity in Tunisia that - in combination with other factors such as weak governance, long-standing inequalities between the interior regions and coast, declining employment opportunities and diminished agricultural livelihoods - could lead to protests or riots and more widespread societal instability, as has happened a decade ago. Second, climate risks of the olives sector in Tunisia could further result in reduced production, especially in monoculture systems that are draining the soil. In the long run, reduced olive yields can cause supply losses and business disruptions for Europe. Moreover, social frustrations are rising due to inequality in the olives sector, where smallholders have limited opportunities (including due to the lack of access to credit and loans) in a sector that is in the hands of the large-scale agri-business.<sup>66</sup> This could further trigger social unrest in rural Tunisia. At the same time, there is fear that the DCFTA, if it would eventually be agreed, could further stimulate an export-oriented trade model, thereby undermining the flourishing of smallholder producers. As mentioned, several factors that led to the 2011 'Freedom and Dignity Revolution' still prevail in Tunisian society. Without perspective, many young Tunisians are joining jihadi groups. They could form a direct threat to Europe. And, large groups of young Tunisians are migrating by boat to Europe, looking for better opportunities.<sup>67</sup>

So far, however, European policy-makers have given lower priority to risks that occur in the future or that are geographically remote with second- or third-order implications. Policy ownership for cascading climate risks has not been designated in the EU context (Mackie 2020). Therefore, it will be important that not only the European development policies, but also the EU Green Deal, the forthcoming EU Adaptation Strategy as well as the EU Trade Policy and the COVID-19 recovery strategies, recognise cascading climate impacts from partner countries further afield, such as Tunisia, and prepare to integrate risk management measures into this wider group of policies.

Concretely, to help overcome the many challenges in Tunisia's agri-food system, the EU should promote socially inclusive and climate-resilient production and trade systems, including in the DCFTA negotiation process, and integrate adaptation action into the wider policy mix of finance, development, diplomacy and security policies (Adams et al. 2020). Given the current political economy context and political competition, where these growing climatic, as well as socio-economic issues, are rising to the surface, the EU needs to better identify where the potential actors and levers for change are. Supporting strong players, such as NGOs, grassroots movements or syndicates, that are pushing for change to policy but running up against a closed economic and political system, could be the most effective way forward.

---

<sup>66</sup> See: <https://reporterre.net/En-Tunisie-la-colere-monte-des-champs-asseches-de-Sidi-Bouzid>.

<sup>67</sup> See: <https://www.theguardian.com/global-development/2020/dec/16/he-ruined-us-10-years-on-tunisians-curse-man-who-sparked-arab-spring>. The current threats of terrorist activities by IS returnees from Syria within Tunisia are minor compared to countries like Egypt, Mali and Nigeria (Herbert 2020).

# Conclusion

Tunisia has made significant political gains since the 'Freedom and Dignity Revolution' that started in 2011, but inclusive and sustainable growth has largely remained elusive. The country's potential for socio-economic growth has stagnated and the challenges are plenty. Unemployment rates, for instance, remain significantly high. Furthermore, the way that the agri-food system has developed through time is putting constraints on socio-economically and environmentally sustainable development, partly caused by the mismanagement of scarce resources and the lack of provision of equal opportunities.

Furthermore, climate change, causing reduced water availability and heat stress, in combination with population growth, will likely decrease agricultural output in Tunisia if current production models are maintained, which will make the country even more sensitive to food imports. This is especially worrisome as, beyond a certain tipping point, a compound event can lead to a chain of cascading events, which in an interconnected world can affect international stability and geopolitical issues with transregional effects. Even if climate change had only a small part to play, it could be a risk multiplier in an already tense socio-economic and political situation. Given the connections between Tunisia with Europe, including the trade, people and financial connections, these risks could cascade into Europe.

The current fallout from COVID-19 demonstrates the need for greater multilateral and regional attention to resilience, particularly in terms of trade, fiscal stimulus policies and social safety-nets. Similarly, actions to approach climate change as a systemic rather than a localised risk include collaborative ways to identify and visualise direct and indirect impacts that cross economic sectors and regional boundaries. They allow to redefine the goals of climate adaptation plans to address system-wide resilience.

**As the EU is revisiting its climate adaptation strategy and deals with fast-changing foreign relations, EU policy-makers should consider the risks of cross-border and cascading impacts in the wider region beyond European borders. On a global scale, it is promising to see that cascading climate risks are climbing the policy agenda: adaptation to cascading climate risks will be more at the forefront of COP26 at the end of this year. Hopefully, this can open the door to more systemic, cross-sectoral adaptation in all parts of the world.**

# Bibliography

- Adams, K.M., Harris, K., Klein, R.J.T., Lager, F. & M. Benzie. 2020. [Climate-Resilient Trade and Production: The Transboundary Effects of Climate Change and Their Implications for EU Member States](#). Adaptation Without Borders Policy Brief 1.
- Adaptation Without Borders. 2019. [Transboundary Climate Risks - An Overview](#). Wilton Park Report - WP1670.
- Adly, A. & H. Meddeb. 2017. [Why Painful Economic Reforms Are Less Risky in Tunisia Than Egypt](#). Carnegie Middle East Center.
- AfDB. 2018. [Gap Analysis Report: African Nationally Determined Contributions \(NDCs\)](#). African Development Bank.
- AfDB. 2019. [Analysis of Adaptation Components of Africa's Nationally Determined Contributions \(NDCs\)](#). African Development Bank.
- Amamou, H, Ben Sassi, M., Aouadi, H., Khemiri, H., Mahouachi, M., Beckers, Y. & H. Hammami. 2018. [Climate Change-Related Risks and Adaptation Strategies as Perceived in Dairy Cattle Farming Systems in Tunisia](#). Climate Risk Management. 20: 38-49.
- Ayeb, H. 2011. [Social and Political Geography of the Tunisian Revolution: the Alfa Grass Revolution](#). Review of African Political Economy. 38 (129): 467-479.
- Bayat, A. 2017. [Revolution without Revolutionaries: Making Sense of the Arab Spring](#). Stanford: Stanford University Press.
- ben Khelifa, G. 2020. [Challenging Agribusiness and Building Alternatives in Tunisia and Morocco](#). Working Group on Food Sovereignty in Tunisia and ATTAC Maroc.
- Ben Zaied, Y. & O. Zouabi. 2016. [Impacts of Climate Change on Tunisian Olive Oil Output](#). Climatic Change. 139 (3-4): 1- 16.
- Benzie, M., J. Hedlund & H. Carlsen. 2016. [Introducing the Transnational Climate Impacts Index: Indicators of country-level exposure – methodology report](#), Working Paper 2016-07. Stockholm: Stockholm Environment Institute.
- Berg, C., Beckmann, G. & A. Schelchen. 2016. [Scenario Building for Development Cooperation - Methods Paper - Example of Rural Transformation in Sub-Saharan Africa](#), SLE Discussion Paper 02/2016. Berlin: Centre for Rural Development (SLE).
- Bressan S., H.M. Nygård & D. Seefeldt. 2019. [Methods For Anticipating Governance Breakdown And Violent Conflict](#). EU-LISTCO Working Paper No. 2.
- Bush R. & H. Ayeb H. 2014. [Small Farmer Uprisings and Rural Neglect in Egypt and Tunisia](#). MERIP. 272.
- Byiers, B & J. Vanheukelom. 2016. [A 'how to' note - Doing Regional Development Differently'- A Political Economy Analysis Framework for Identifying Drivers and Constraints to Regional Integration](#). Maastricht: ECDPM.
- Byiers, B., M. Ronceray & J. Bossuyt. 2021. [Applying a political economy approach in Tunisia](#). ECDPM paper. Maastricht: ECDPM.
- Cardona, O.D., M.K. van Aalst, J. Birkmann, M. Fordham, G. McGregor, R. Perez, R.S. Pulwarty, E.L.F. Schipper & B.T. Sinh. 2012. ["Determinants of risk: exposure and vulnerability"](#). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the IPCC. Cambridge & New York: Cambridge University Press: 65-108.
- Challinor, A.J., Adger, N.W., Benton, T.G., Conway, D., Joshi, M. & D. Frame. 2018. [Transmission of Climate Risks across Sectors and Borders](#). Philosophical Transactions of the Royal Society A. 376 (2121): 1-23.
- Chebbi, H.E., Pellissier, J.-P., Khechimi, W. & J.-P. Rolland. 2019. [Rapport de synthèse sur l'agriculture en Tunisie](#). CIHEAM-IAMM.
- Chiafetz, A. & P. Jagger. 2014. [40 Years of Dialogue on Food Sovereignty: A Review and a Look Ahead](#). Global Food Security. 3 (2): 85-91.

- Clapp, J. 2017. [Food self-sufficiency: Making sense of it, and when it makes sense](#). *Food Policy*. 66: 88-96.
- Colombo, S. 2018. [Political and Institutional Transition in North Africa - Egypt and Tunisia in Comparative Perspective](#). *Routledge Studies in Middle Eastern Democratisation and Government*. Oxon & New York: Routledge.
- Dekeyser, K., Korsten, L. & L. Fioramonti. 2018. [Food Sovereignty: Shifting Debates on Democratic Food Governance](#). *Food Security*. 10: 223-233.
- Detges, A., Klungenfeld, D., König, C., Pohl, B., Rüttinger, L., Schewe, J., Sedova, B. & J. Vivekananda. 2020. [10 Insights on Climate Impacts and Peace: A summary of what we know](#). adelphi and the Potsdam Institute for Climate Impact Research (PIK), June 2020
- EJF. 2017. [Beyond Borders: Our Changing Climate - Its Role in Conflict and Displacement](#). UK: The Environmental Justice Foundation (EJF).
- FAO. 2013. [Climate Change and Agriculture Scenarios for Malawi. Socio Economic Scenarios](#). Report of the Workshop. Rome: Food and Agriculture Organization of the United Nations.
- FAO. 2015. [Tunisie – Analyse de la filière oléicole](#). Rome: Food and Agriculture Organisation of the United Nations.
- FAO. 2017. [Tunisia Country Fact Sheet on Food and Agriculture Policy Trends - Socio-Economic Context and Role of Agriculture](#). Rome: Food and Agriculture Organisation of the United Nations.
- FAO. 2020. [Document d'orientation: Impact de la crise COVID-19 sur l'agriculture et la sécurité alimentaire en Tunisie: Défis et options de réponses](#). Rome: Food and Agriculture Organisation of the United Nations.
- Ghilès F. & E. Woertz. 2018. [Tunisian Phosphates and the Politics of the Periphery](#). *Environmental Politics in the Middle East*. H. Verhoeven (Ed.). Oxford: Oxford Scholarship Online.
- Grumiller, J., Grohs, H., Raza, W., Staritz, C. & T. Bernhard. 2018. [Strategies for Sustainable Upgrading in Global Value Chains: The Tunisian Olive Oil Sector](#). ÖFSE Policy Note No. 26/2018. Vienna: Austrian Foundation for Development Research (ÖFSE).
- Herbert, M. 2020. [Warning Signs from Tunisia's Localised Terrorist Insurgency](#). ISS Today.
- Hildén, M., Lahn, G., Carter, T.R., Klein, R.J.T., Otto, I.M., Pohl, B., Reyer, C.P.O. & F. Tondel. 2020. [Cascading climate impacts: a new factor in European policy-making](#). *Cascades Policy Brief*.
- IEP. 2020 [Ecological Threat Register 2020: Understanding Ecological Threats, Resilience and Peace](#). Sydney: Institute for Economics & Peace (IEP).
- IPCC, 2007. [Climate Change 2007: Impacts, Adaptation and Vulnerability](#). Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp.
- Kherigi, I. 2018. Deepening Democracy in Transitional Tunisia: A New Chapter for Local Governance. In: *North Africa Hope in Troubled Times*. *Great Insights*. 7(4). Maastricht: ECDPM.
- Kinnunen, P., Guillaume, J.H.A., Taka, M. et al. 2020. [Local food crop production can fulfil demand for less than one-third of the population](#). *Nature Food* 1: 229–237.
- Knaepen, H. 2013. [Mainstreaming Climate Change Adaptation into Vietnamese Development as a New Policy Arrangement](#). Doctoral Thesis. Kyoto, Japan: Kyoto University - Graduate School of Global Environmental Studies.
- Kohli, A., Steinemann, M. & N. Denisov. 2018. [Fragility and Conflict](#). *Climate Change & Environment - Nexus Brief 5*. SDC Climate Change and Environment Network.
- Kwasi, S., Cilliers, J. & L. Welborn. 2020. [The Rebirth: Tunisia's Potential Development Pathways to 2040](#). *North Africa Report 4*. Institute for Security Studies (ISS).
- Lewis, K.H. & T.M. Lenton. 2015. [Knowledge Problems in Climate Change and Security Research](#). *Wiley Interdisciplinary Reviews Climate Change*. 6(4): 383-399.
- Loewe, M., Zintl, T. & A. Houdret. 2020. [The Social Contract as a Tool of Analysis: Introduction to the Special issue on "framing the Evolution of New Social Contracts in Middle Eastern and North African Countries"](#). *World Development*.
- Mackie, J. 2020. [Promoting Policy Coherence: Lessons Learned in EU Development Cooperation](#). *Cascades Policy Brief*.
- Meddeb, H. 2020. [Tunisia's Geography of Anger: Regional Inequalities and the Rise of Populism](#). *Carnegie Middle East Center*.

- Mikaelsson, M. A. 2020. [The Transboundary Risks of Climate Change](#). Blog. UK: Foreign, Commonwealth & Development Office.
- Ministry of Local Affairs and Environment. 2014. [Tunisia's Third National Communication as Part of the United Nations Framework Convention on Climate Change](#).
- Ministry of Foreign Affairs of the Netherlands. 2018. [Climate Change Profile Tunisia](#). The Hague: Ministry of Foreign Affairs.
- Nelson, G. C., Rosegrant, M. W., Palazzo, A., Gray, I., Ingersoll, C., Robertson, R., Tokgoz, S., Zhu, T., Sulser, T. B., Ringler, C., Msangi, S. & L. You. 2010. [Food security, farming, and climate change to 2050: Scenarios, results, policy options](#). Washington: International Food Policy Research Institute (IFPRI).
- Newman, E. 2018. [Food Security and Political Unrest in Tunisia: Case study report](#). Working Paper. Leeds: School of Politics and International Studies, University of Leeds.
- OECD/FAO. 2018. [OECD-FAO Agricultural Outlook 2018-2027](#). Paris: OECD Publishing, Rome: Food and Agriculture Organisation of the United Nations.
- Oxfam. 2020. [Incoherent at Heart - The EU's Economic and Migration Policies towards North Africa](#). Oxford: Oxfam GB.
- Riahi, L. & H. Hamouchene. 2020. [Deep and Comprehensive Dependency: How a Trade Agreement with the EU Could Devastate the Tunisian Economy](#). Tunisian Platform of Alternatives.
- Rousselin, M. 2018. "A Study in Dispossession: The Political Ecology of Phosphate in Tunisia". In: *Journal of Political Ecology*. Vol. 25 (1), pp. 20-39.
- Rudloff, B. 2020. [A Stable Countryside for a Stable Country? The Effects of a DCFTA with the EU on Tunisian Agriculture](#). SWP Research Paper. German Institute for International and Security Affairs: Stiftung Wissenschaft und Politik.
- Rüttinger, L., Smith, D., Stang, G., Tänzler, D., & J. Vivekananda. 2015. [A new climate for peace: Taking action on climate and fragility risks](#). Independent Report Commissioned by the G7 Members, adelphi, International Alert, Wilson Center, European Union Institute for Security Studies.
- Scheffran, J., Link, P.M. and J. Schilling. 2012. [Theories and Models of Climate-Security Interaction: Framework and Application to a Climate Hot Spot in North Africa](#). Climate Change, Human Security and Violent Conflict. Hexagon Series on Human and Environmental Security and Peace 8. Berlin Heidelberg: Springer-Verlag.
- Sharma, J. & N. Ravindranath. 2019. [Applying IPCC 2014 Framework for Hazard-Specific Vulnerability Assessment under Climate Change](#). *Environ. Res. Commun.* 1: 1-8.
- Soler i Lecha, A. 2020. [The Magreb and the European Bid for Africa](#). *Notes Internacionals* 228. CIDOB.
- Sternberg, T. 2012. [Chinese Drought, Bread and the Arab Spring](#). *Applied Geography*. 34: 519-524.
- UNFCCC. 2015. [Intended Nationally Determined Contribution - Tunisia](#). UNFCCC.
- USAID. 2018. [Climate Risk Profile: Tunisia](#). United States Agency for International Development
- Verhoeven. 2018. [Environmental Politics in the Middle East](#). Oxford Scholarship Online.
- Verner, D., Treguer, D., Redwood, J., Christensen, J., McDonnell, R., Elbert, C. & Y. Konishi. 2018. [Climate Variability, Drought, and Drought Management in Tunisia's Agricultural Sector](#). World Bank Group.
- World Bank. 2014a. [The Unfinished Revolution - Bringing Opportunity, Good Jobs And Greater Wealth to All Tunisians](#). Development Policy Review.
- World Bank. 2014b. [Tunisia: Breaking the Barriers to Youth Inclusion](#). Washington, DC: World Bank.
- World Bank. 2020. [Convergence: Five Critical Steps toward Integrating Lagging and Leading Areas in the Middle East and North Africa](#). Washington, DC: World Bank.
- Yerkes, S. & M. Muasher. 2018. [Decentralisation in Tunisia - Empowering Towns, Engaging People](#). Carnegie Endowment for International Peace.
- You, H., H. Jin, A. Khaldi, M. Kwak, T. Lee, I. Khaine, J. Jang, H. Lee, I. Kim, T. Ahn, J. Song, Y. Song, A. Khorchani, B. Stiti, & S. Woo. 2016. [Plant Diversity in Different Bioclimatic Zones in Tunisia](#), *Journal of Asia-Pacific Biodiversity*. 9: 56-62.



The project has been funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 821010

*ecdpm*

### **Author biography**

Hanne Knaepen specialises in climate change adaptation within the context of Europe-Africa relations, with a strong focus on agri-food systems and climate finance. She joined the European Centre for Development Policy Management (ECDPM) in 2013, where she is a policy officer in the Sustainable Food Systems programme. She is also a Visiting Lecturer at Nyansapo College of International Relations and Diplomacy, Accra (University of Cape Coast) since 2016, where she teaches courses on climate risks and international development. Prior to ECDPM, she obtained a doctoral degree in Global Environmental Studies at Kyoto University, Japan.