



# In the eye of the storm: Resilience against extreme weather events in the MENA region

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# Introduction

The Middle East and North Africa (MENA) region is witnessing a notable rise in the frequency and severity of extreme weather events. This trend underscores the region's growing vulnerability to the adverse effects of climate change, which manifest in various forms such as droughts, forest fires, heatwaves, and floods. Communities in the region are increasingly feeling the impact and distress caused by such events. The problem lies in the fact that MENA countries are not ready and resilient enough to face the consequences of such increasing extreme events. Recent floods in Dubai, United Arab Emirates and Derna, Libya have unveiled both countries' lack of preparedness and adaptive capacity, respectively. While both countries have starkly different political contexts, facilities and adaptation capacities, more frequent extreme weather events have become an environmental reality in the region. As a result, communities will further be exposed to economic and social challenges. The increasing risk of extreme weather events in the MENA region thus clearly shows that better preparedness and adaptation instruments to such events must be integrated in national planning.

With this in mind, the paper at hand explores the adverse effects of extreme weather events in the MENA region, particularly focusing on their impact on agriculture, water resources, tourism, infrastructure, and population dynamics, as these sectors and aspects are impacted most heavily and are essential for the development of the region. It also examines existing challenges that hinder government resilience, including political, socio-economic, funding, and budget allocation challenges and evaluates existing methods for increased resilience, like early warning systems and regional cooperation as a mechanism and platform, while considering their limitations. Based on the findings, the paper draws conclusions to address the vulnerabilities and enhance resilience of MENA countries and populations against extreme weather events.

# The MENA region in the face of extreme weather events

The impacts of extreme weather events are categorized into three groups, as defined by the Intergovernmental Panel on Climate Change (IPCC): changes in the natural environment, changes in ecosystems, and adverse effects. For the purposes of this paper, we will focus on the adverse effects since it pertains to the impact on human and societal conditions, as well as assets.

# **Agriculture and Water**

The agricultural sector remains pivotal in the MENA region, particularly as a significant source of employment. However, with the onset of extreme weather events, the sector faces numerous challenges. These include reductions in crop productivity, salinisation, desertification, exposure to flooding, increased water shortages, insufficient water provision for crops and livestock, as well as deteriorating working conditions for outdoor tasks. Projections indicate a 15-45%¹ reduction in freshwater availability by the end of the century, significantly impacting a sector that relies 70% on rain-fed agriculture. About 1/3 of land areas² in the region will be affected by heatwaves and droughts. Consequently, due to water stress, the region is already experiencing decreased agricultural productivity, potentially deepening its dependence on food imports, heightening its vulnerability to global price shocks, and multiplying its risk for food shortages³.

# **Tourism**

For many countries in the MENA region, tourism is a strategic sector that is crucial for economic diversification and capital accumulation. However, it faces significant challenges due to extreme weather events as they heavily damage buildings, amenities, roads, and natural heritage sites. For instance, the

rising temperatures damaged famous monuments in Egypt and changed the colour of archaeological stones. In 2018, floods forced the evacuation of nearly 4000 tourists in Petra, Jordan and killed 21 people, mostly children, near the Dead Sea<sup>4</sup>. Forest fires in Tunisia raged through 450ha of pine forest near Tabarka, a touristic coastal town, leading its border neighbour country Algeria to call tourists traveling there to postpone their plans<sup>5</sup>. Such events continue to exacerbate the vulnerability of a region that heavily relies on tourism as a top earner of foreign currency and an important employer<sup>6</sup>.

# **Infrastructure**

With low adaptive capacity, particularly in conflict-affected areas where capacities have been weak-ened, extreme weather events are putting pressure on the MENA region's infrastructure, including energy plants, dams, and transportation systems. As one example, droughts can limit solar generation potential and cause erosion and sedimentation that hinders water and land-based transport. Therefore, 75% of infrastructure is expected to be at direct climate risk in the coming years. Additionally, extreme weather events strain infrastructure and resource management systems. leading to height-ened tensions at both national and regional levels. This impact is alarming as it directly affects the operational capabilities of countries in the region, and can eventually lead to large-scale catastrophes, as was showcased in the event of floods in Derna, Libya. In this case, the flood was caused by the collapse of a fragile dam – with high casualty numbers also linked to the failure of Libyan authorities to issue early warnings and implement risk mitigation measures ahead of Storm Daniel, the initial trigger.

# Population and displacement patterns

Around 305,000 people in the region were forced to flee their homes due to climate-induced events in 2022, marking a significant 30% increase compared to 2021<sup>10</sup>. Notably, oil-rich countries remain a common destination for those seeking to increase their livelihoods and seek better economic security<sup>11</sup>. Alongside this migration, urbanisation is also another identified trend, often stemming from resource mismanagement during crises and contributing to political and social tensions<sup>12</sup>. Displacement can further widen the socio-economic gaps within MENA communities. Migrants might face overcrowding, poor water quality and health risks in their host countries or cities, making it harder for them to access services and find employment<sup>13</sup>. While some countries possess the capacity and resources to accept migrants into their lands, others are barely managing the repercussions of internal displacement<sup>14</sup>.

# Existing challenges for resilience of the MENA region in the face of extreme weather events

# The political and socio-economic challenge

Experts agree that the region faces a set of interconnected political and socio-economic variables that exacerbate its insufficient resilience in the face of extreme weather events. These can take the form of weak policies regarding food, water, and land access; property rights regimes; repressive, authoritarian governance; and deliberate destruction of the environment by governments and nonstate actors¹⁵. Additionally, the MENA region suffers from significant structural problems such as unequal distribution of wealth, high population growth, skills mismatch, and high unemployment¹⁶.

Weak and fractured political institutions make many countries ill-equipped to absorb the consequences of extreme weather events. To illustrate, economies of conflict-affected and weak countries cannot afford to build new roads and houses, to build dams, or to deploy other strategies to adapt to these events<sup>17</sup>. Consequently, countries become less resilient and more vulnerable, increasing risks of

political instability and insecurity. This, in turn, exacerbates the impact of extreme weather events, as demonstrated by the Derna floods.

While such a link is complex, it is important to note that extreme weather events threaten livelihoods and result in adverse consequences on people's wellbeing, particularly due to the weakness of many governments in the region. As a result, the burden of the damage shifts onto individuals and families. This situation might eventually lead to implications for societal, economic, or political stability at local, national, regional, or international levels¹8. For instance, the unprecedented drought witnessed in Iraq sparked a tribal armed conflict in the northern region of Basra in 2020 due to a disagreement over water distribution¹9. With a lack of good governance and mitigation measures, extreme weather events, such as droughts, pose a serious threat to countries' stability.

# The funding and budget allocation challenge

The MENA region also faces a significant climate funding challenge, with an estimated need of USD 570 billion in climate funding while receiving only 11% of climate finance over the period 2000-2020. The region already contends with numerous challenges and ongoing conflicts, which further strain countries' resources. Moreover, the politically diverse nature of the region impacts the way these international funds are distributed, with some receiving significantly lower shares than others.

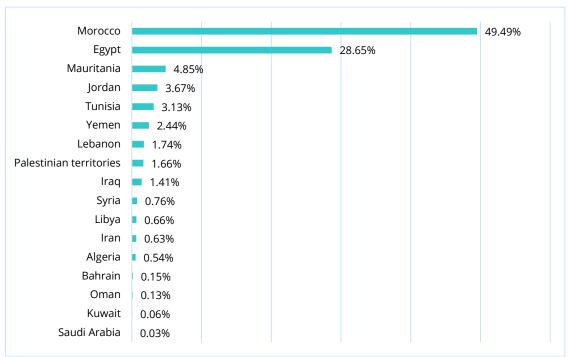


Figure 1 – Portions of climate finance for respective MENA countries, in descending order. Source: Data set by the Climate Funds Update.

While Morocco and Egypt, with 49% and 28% respectively, receive most of the international climate funding in the region, as depicted in Figure 1<sup>21</sup>, countries like Libya and Syria, heavily impacted by climate change and conflict, only receive marginal shares. This imbalance can be explained by the fact that both Morocco and Egypt have an enabling environment and capacity to develop major projects. Most of their climate finance goes to mitigation projects<sup>22</sup>, especially in the fields of renewable energies. However, the increasing frequency of extreme weather events necessitates funding for adaptation, yet the preference for funding mitigation projects in the energy, transport, and infrastructure sectors (75%) and some allocation to water and sanitation projects (15%) exacerbates the disparity<sup>23</sup>. This preference persists despite the region's ongoing water crisis. The current reality in the region's countries, marked

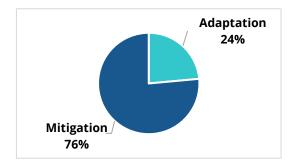


Figure 2 - Allocation of international climate funds in the MENA region. Source: Data set by Climate Funds Update

by a lack of resources and the urgency of crises, presents a challenge in budget allocation where mitigation takes most of the funds.

However, it is important to note that even this existing climate financing remains modest when put in contrast with the region's need to face the impacts of extreme weather events. Adding to this challenge is the fact that some MENA countries, especially those who are vulnerable and conflict-affected, have ineffective management of climate finances; and a lack of transparency in climate finance accounting<sup>24</sup> and climate consideration in fiscal policies, regulations, and budget planning.

# The current resilience landscape in the MENA region

While the region's challenges and impacts of extreme weather events persist, it is important to examine the existing resilience landscape in the MENA to understand what mechanisms are being implemented to enhance its preparedness and anticipation.

# Existing mechanisms for increased resilience in the face of extreme weather events

As was demonstrated in the example of the floods in Libya of September 2023, anticipatory action is crucial, and any delayed response can unnecessarily expose people, societies, and systems to stress and degradation. Often responses are slow and late due to a lack of planning, coordination, and accountability. However, it is worth noting that adaptation planning is being integrated and mainstreamed in national development plans through climate change policies<sup>25</sup>. For instance, Saudi Arabia has conducted vulnerability assessments and developed climate scenarios focusing on water resources, desertification, agriculture, and health<sup>26</sup>. Additionally, governments are continuously identifying opportunities to coordinate adaptation planning between institutions, sectors, and regions. Countries like Jordan, Algeria and Bahrain have set up climate change committees. Forecasting and risk information and management systems have been established in different countries<sup>2728</sup>, primarily focusing on drought and floods, to allow governments time to minimize damages and impact. For instance, Tunisia has advanced its forecasting capacity in recent years, particularly for floods, through its *Institut National de Métérologie* (INM - National Institute of Meteorology) and the *Direction Générale des Ressource en Eau* (DGRE - General Directorate for Water Resources)<sup>29</sup>.

However, the current effectiveness of anticipatory action in the region must be examined. While efforts are made to enhance forecasting, there is "a lack of translating early warning information into early action" due to limited capacities and coordination. The lack of coordination and data sharing across institutions, gaps in forecasting, weak data landscapes and limited funds represent a challenge to the adaptive capacity of the region. The aforementioned challenges for countries in the region also mean that many have not been able to sufficiently invest in this much needed infrastructure, due to diverse socio-economic and political challenges, which capture funding and political attention. This is even more pronounced in countries characterised by weak and fragile institutions, political instability, and conflict. In fact, in conflict contexts, the necessary prioritisation of adaptation is almost impossible, while at the same time challenges to the efficient operation of early warning systems arise since institutions have become weakened by both conflict and political changes. This makes it harder for these

countries to have adequate and appropriate adaptive capacity to face extreme weather events when even basic needs are not met.

# Regional cooperation for joint efforts against extreme weather events

In the MENA region, two mechanisms of cooperation concerning extreme weather events are most visible and relevant on the regional scene: Regional Climate Centre (RCC) Networks and Regional Climate Outlook Forums (RCOF).

# Regional Climate Centre (RCC) Networks in the MENA region

RCC networks are a group of centres that focuses on climate forecasting, monitoring, data services and training<sup>31</sup>. They facilitate climate action through capacity building, technical assistance, and strategic networking, mobilizing resources and knowledge to ensure sustainable and clean development for WMO member states. The RCC MENA and South Asia focus on filling the knowledge gap in adaptation to climate change, creating strategies to access climate finance, increasing regional cooperation on climate action, strengthening youth capacity to contribute to responses to climate change, and introducing new tools to address climate change and build climate-resilient development in the region.

### **Regional Climate Outlook Forums (RCOF)**

RCOFs are platforms that "bring together national, regional, and international climate experts and stakeholders' representatives from countries with common interests to provide climate predictions based on input from National Meteorological and Hydrological Services (NMHSs), regional institutions, WMO Regional Climate Centres (RCCs), Global Producing Centres for Long-Range Forecasts (GPC-LRFs), and other climate prediction centres."<sup>32</sup>. In the case of the MENA region, there are several RCOFs operating in its countries. For example, the MedCOF serves as an umbrella for existing COFs like PRESANORD, which includes Algeria, Egypt, Libya, Morocco, and Tunisia, and integrates other countries like Jordan, Lebanon, and Syria. There is also the ArabCOF, which is made up of Algeria, Egypt, Jordan, Kuwait, Libya, Mauritania, Morocco, Oman, Saudi Arabia, Tunisia, UAE, and Yemen. Additionally, there is the GHACOF, which includes Sudan and South Sudan.

## Limitations and weaknesses of current cooperation efforts

Collaboration and data sharing remains a challenge across the MENA region. Many databases are not updated regularly. For example, in Egypt, national disaster databases and vulnerability and exposure data are considered incomplete and outdated<sup>33</sup>. Additionally, the efforts of some institutions overlap and thus might hamper governments effort in anticipating extreme weather events. In Tunisia, the INM operates a network of weather data collection stations across the country. At the same time, the Ministry of Agriculture operates agrometeorological stations and the DGRE has established precipitation and surface water stations, resulting in scattered data and a lack of coordination. This limits collaboration across the region around risk information sharing, forecasting and early warning<sup>34</sup>, despite the transboundary nature of extreme weather events.

These dysfunctionalities are further exacerbated in conflict-affected regions where institutional capacity and funding required to develop forecasts, risk assessments and early warning systems is limited to non-existent. Cases like Yemen and Syria show how most information regarding extreme weather events come from international organizations: in the absence of local capacities, REACH, a joint initiative of IMPACT Initiatives, ACTED and the United Nations Operational Satellite Applications Programme (UNOSAT), conducted flood susceptibility analyses which has used satellite imagery and flood hazard mapping to identify flood risk in internally displaced people shelters in Syria and Yemen. This further underscores governments' insufficient capacities to bolster their countries' and populations' resilience against extreme weather events.

# Conclusion

To conclude, extreme weather events act as a challenge to MENA countries' existing capacities. As it was demonstrated throughout the paper, the low adaptive capacity, compounded with insufficient climate funding, socio-economic factors and lack of collaboration and data-sharing, decreases the ability of the region to face the consequences of the adverse effects of such events. Despite these diverse challenges, there are nevertheless targeted measures and regional cooperation mechanisms which can enhance resilience in the MENA region.

Policymakers in the MENA are increasingly becoming aware of the importance of climate action as livelihoods are getting significantly threatened. As a case in point, the discussions at the two consecutive COPs held in Egypt (2022) and the UAE (2023) demonstrated the heightened sense of urgency felt across the region. The international attention brought by "[these conferences] have contributed to increased knowledge and action regarding climate adaptation and mitigation strategies in the region"<sup>37</sup>. This highlights the role of the international community to bring up these discussions.

While many countries in the region have made efforts – albeit with widely differing capacities and progress – to develop mechanisms to both adapt and mitigate impacts of extreme weather events, gaps persist. Governments in question must, for example, enhance their early warning systems to make sure they provide information for timely action<sup>38</sup> in a sense where they are embedded in national systems and plannings<sup>39</sup>; and funded by long term sustainable finances. Moreover, it is important to include conflict and economic risks in such systems to anticipate decision-making processes.

It is important to note that the conflict risks that some countries of the region face limits progress towards enhanced resilience. When local governance and authority is dysfunctional, it is hard to identify stakeholders that can contribute to the implementation of these adaption and mitigation measures - hence, the need for conflict-sensitive approaches and information systems that identify fragility, conflict, and vulnerability dynamics and overlay them with the appropriate information of in relation to extreme weather events. Approaches that consider political differences can prevent power imbalances and tailor climate information to become an entry point of collaboration and cooperation to increase the region's resilience. In this sense, information systems that take into account the aforementioned elements can allow the creation of international cooperation platforms where countries share their expertise and best practices in a timely manner. Further strengthening cooperation mechanisms can help bolster representation of the MENA region in discussions of adaption to effects of extreme weather events.

A stronger representation in such fora is also an essential element given that the region suffers from lack of international climate financing. Countries must thus work on attracting large scale sustainable investments to fill their specific gaps in forecasting and information systems. This would allow them to orient their existing funds or look for additional finances to fill their specific needs. Accordingly, climate finance can serve as an entry point for dialogue and cooperation between different stakeholders, both regionally and internationally, where conflict-sensitive regional financial instruments can be developed. Mobilization and efforts in this regard are essential to enhance the preparedness and anticipation of countries in the region.

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