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Global Social Sciences Review
exploring humanity

ISSN-P : 2520-0348
ISSN-E : 2616-793X

VOL. XI ISSUE II, Spring (JUNE-2026)

GSSR

GLOBAL SOCIAL SCIENES REVIEW

HEC-RECOGNIZED CATEGORY-Y

GLOBAL SOCIAL SCIENCES REVIEW (GSSR)

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DOI (Journal): 10.31703/gssr
DOI (Volume): 10.31703/gssr.2026(XI)
DOI (Issue): 10.31703/gssr.2026(XI-II)

Double-blind Peer-review Research Journal
www.gssrjournal.com

Humanity Publications (HumaPub)
www.humapub.com
Doi: https://dx.doi.org/10.31703

Title: Climate Change Vulnerabilities and Resilience in North Africa

Abstract

The North African region is one of the most climate change vulnerable areas in the world; as a result of the global climate change, it has been suffering from severe environmental, economic and social challenges. The regional prominence of these extreme climate change related problems worsening the security situation of the region before impinging on it – most notably water scarcity, desertification, decline in agricultural output, and food insecurity – is the area of focus of this research. This research explores a challenging context to respond to at the national and regional scale, hereby focusing on the policy level, such as the Agenda 2063 of the African Union, Africa Climate Initiatives of the UNEP and the Climate and Health Strategic Framework 2025 of the Africa CDC.

Keywords: Climate change Adaptation, Environmental Resilience, Sustainable Development, Policy Frameworks, North Africa, Regional Climate Governance

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Pages: 60-69
DOI:10.31703/gssr.2026(XI-II).06
DOI link: https://dx.doi.org/10.31703/gssr.2026(XI-II).06
Article link: https://gssrjournal.com/articleclimate-change-vulnerabilities-and-resilience-in-north-africa
Full-text Link: https://gssrjournal.com/article/climate-change-vulnerabilities-and-resilience-in-north-africa
Pdf link: https://www.gssrjournal.com/jadmin/Auther/31rvIolA2.pdf

Global Social Sciences Review

p-ISSN: 2520-0348 **e-ISSN:** 2616-793x
DOI(journal):10.31703/gssr
Volume: XI (2026)
DOI (volume):10.31703/gssr.2026(XI)
Issue: II Spring (June-2026)
DOI(Issue):10.31703/gssr.2026(XI-II)
Home Page
www.gssrjournal.com
Volume: XI (2026)
https://www.gssrjournal.com/Current-issue
Issue: II-Spring (June 2026)
https://www.gssrjournal.com/issue/11/2/2026
Scope
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www.humapub.com
Doi: https://dx.doi.org/10.31703

Citing this Article

Article Serial	06
Article Title	Climate Change Vulnerabilities and Resilience in North Africa
Authors	Urwa Nasir Virda Hayyat Bilal Bin Liaqat
DOI	10.31703/gssr.2026(XI-II).06
Pages	60–69
Year	2026
Volume	XI
Issue	II

Referencing & Citing Styles

APA	Nasir, U., Hayyat, V., & Liaqat, B. B. (2026). Climate Change Vulnerabilities and Resilience in North Africa. *Global Social Sciences Review*, *11*(2), 60-69. https://doi.org/10.31703/gssr.2026(XI-II).06
CHICAGO	Nasir, Urwa, Virda Hayyat, and Bilal Bin Liaqat. 2026. "Climate Change Vulnerabilities and Resilience in North Africa." *Global Social Sciences Review* 11 (2):60-69. doi: 10.31703/gssr.2026(XI-II).06.
HARVARD	NASIR, U., HAYYAT, V. & LIAQAT, B. B. 2026. Climate Change Vulnerabilities and Resilience in North Africa. *Global Social Sciences Review*, 11**,** 60-69.
MHRA	Nasir, Urwa, Virda Hayyat, and Bilal Bin Liaqat. 2026. 'Climate Change Vulnerabilities and Resilience in North Africa', *Global Social Sciences Review*, 11: 60-69.
MLA	Nasir, Urwa, Virda Hayyat, and Bilal Bin Liaqat. "Climate Change Vulnerabilities and Resilience in North Africa." *Global Social Sciences Review* 11.2 (2026): 60-69. Print.
OXFORD	Nasir, Urwa, Hayyat, Virda, and Liaqat, Bilal Bin (2026), 'Climate Change Vulnerabilities and Resilience in North Africa', *Global Social Sciences Review*, 11 (2), 60-69.
TURABIAN	Nasir, Urwa, Virda Hayyat, and Bilal Bin Liaqat. "Climate Change Vulnerabilities and Resilience in North Africa." *Global Social Sciences Review* 11, no. 2 (2026): 60-69. https://dx.doi.org/10.31703/gssr.2026(XI-II).06.

Global Social Sciences Review
ISSN-P : 2520-0348 | DOI: https://dx.doi.org/10.31703/gssr.2026(XI-II).06 | ISSN-E : 2616-793x
www.gssrjournal.com

Climate Change Vulnerabilities and Resilience in North Africa

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Abstract

The North African region is among the most vulnerable to climate change in the world; as a result of global climate change, it has been suffering from severe environmental, economic and social challenges. The regional prominence of these extreme climate change-related problems, which are worsening the security situation of the region, is the focus of this research. These problems include water scarcity, desertification, a decline in agricultural output, and food insecurity. This research explores a challenging context for responding at the national and regional scales, focusing on the policy level, such as the Agenda 2063 of the African Union, Africa Climate Initiatives of the UNEP, and the Climate and Health Strategic Framework 2025 of the Africa CDC.

Keywords: *Climate change Adaptation, Environmental Resilience, Sustainable Development, Policy Frameworks, North Africa, Regional Climate Governance*

Introduction

Human-induced climate change continues to be a major challenge which has a negative impact on the world's environmental, economic, and social spheres. North Africa which comprises countries such as Egypt, Morocco, Algeria, Tunisia, and Libya is a region that is facing the worsening of its climate-related risks due to the combination of the aridity of its climate, the fragility of its ecosystems, and its high dependence on natural resources. The shortage of water, desertification, and rising of heat in the region are not only putting food security, public health, and economic stability at risk, but also the risk of social unrest and migration is going up at the same time(UNEP, 2024). The issues in the area's structures, for example, the weak institutional capacity, poor governance, and unbalanced economic development, are the main factors behind North Africa's vulnerability. These factors, in general, hinder the successful implementation of adaptation and mitigation strategies. According to Olawuyi, the governance problems and inadequately coordinated policy frameworks have led to local climate response as being disjointed and inefficient, although awareness level has been rising(Olawuyi, 2021). Besides, Eltinay and Egbu consider that rapid urbanization and population growth have become the primary reasons for the overconsumption of limited water and agricultural resources, which have resulted in the intensification of climate-induced pressures (Ebi et al., 2021). The region and the planet have therefore had to implement different plans to increase the area's resistance level and the ability to live her ecologically friendly way of life. The African agenda 2063 envisions a future where Africa becomes more resilient to climate change by managing its resources sustainably cooperation among its regions.Similarly, Africa Climate Initiatives by UNEP are Africa's intentional steps to make a good environment for the easy assimilation of the adaptation measures, i.e., giving a primary focus to clean energy, water-saving, and eco-friendly agriculture(UNEP, 2024). However, essentially, these policies differ in several ways regarding linking the domestic efforts with the regional objectives and also in the confidence of the most vulnerable group's participation in their adaptation strategies. This research deals with the impact of climate change and the different methods employed to

enhance the resilience of the region in the North African area. Special emphasis has been laid on the interrelation of the environmental, governance, and socio-economic factors that influence the adaptive capacity of the region. The article, based on secondary data releases like the international reports, regional policy documents, and academic papers, tries to provide an understanding of the obstacles, potentialities, and the quite different ways leading to climate resilience against the drastic environmental changes in the North Africa.

Literature Review

In the article titled '*Climate Governance in MENA and Africa: Knowledge, Policies, and Cooperation*" by Ahmed Eladawy, the author discusses the similarities between the institutional and resource capacities of the regions of the Middle East and North Africa (MENA) and Africa despite the enormous differences between the two in terms of climate-related issues. He identifies lack of knowledge and resource disparities by noting that a tiny fraction of the global climate-research output is based in these regions (only more than 12 percent of 25,899 publications) and that African institutions get approximately 14.5 percent of the global climate research funds. Eladawy points out that such inequity compromises policy-relevance and local ownership of climate responses, as most policies are imported based on Global North models, which do not fit the situation. On governance and implementation of policies, he observes that the enduring challenges in the two regions of poor adaptive capacity include centralized decision-making, limited participation of the local stakeholders, and lack of institutional coordination. Lastly, the author highlights the possibility of a closer collaboration between MENA and African states, especially through the joint early-warning systems, trans-boundary agreements and fair mechanisms of climate financing, to transform knowledge gains into more effective and inclusive climate governance (Eladawy, 2025).

In the study "*Managing Threats to Food Security: Water and Agricultural Resilience in North Africa*" by Mohammed Mahmoud, the author examines how the interplay of water scarcity, climate change, and agricultural vulnerabilities is mounting pressure on food security across North-African countries. He explains that agriculture in the region is highly dependent on water – with some states withdrawing upwards of 80 % of their freshwater for farming, making them acutely vulnerable to changing precipitation and rising demand. Mahmoud points out that outdated irrigation practices (such as flood irrigation) and weak land-management systems amplify the impact of droughts, soil salinisation and desertification, slowing productivity gains even as demographic pressures rise. Significantly, Mahmoud argues that addressing these threats will require a multi-pronged policy response: upgrading irrigation technologies (drip, centre-pivot), diversifying crop types to less water-intensive varieties, improving land-management, and strengthening governance frameworks around water-agriculture nexus.

In the document "*Africa Centres for Disease Control and Prevention (Africa CDC): Climate Change and Health: Strategic Framework*" the authors emphasize that the human health is disproving the impact of climate change across Africa, with 56 per cent of over 2,000 events of public-health under the notions of climate change being connected to the issue. They highlight that the health systems in the continent need to transform into climate resilient organizations by incorporating main principles of guidance, including the One Health approach, partnership and collaboration, equitable financing, technological innovations and community inclusion. In addition, the framework suggests the building of institutional capacities at the continental, regional and national scales, the establishment of coordinated evidence-based responses, the alignment of health-infrastructure development with climate-adaptation measures in order to reduce risks such as outbreak of water-borne diseases, malnutrition due to food-insecurity, and injuries associated with extreme weather. Overall, the Strategic Framework is a blueprint of the African region in terms of developing climate-adaptive health systems, but based on the principles of equity, accountability and long-term investment to safeguard the most vulnerable populations.

In the article "*Africa's Smallholder Farmers Face Collapse if We Do Not Act on Climate Change*" by Choptiany, the author indicates that African smallholder farmers which are the main drivers of food and nutrition security on the continent are being driven into a perfect storm of climate-related shocks like extreme heat, droughts, floods and irregular rainfalls. He notes that about 95 percent of African farmers rely on rain-fed agriculture, and with farms failing or shipping low yields, these farmers usually lack the

fall-back option, which means internal displacement and increases the food insecurity risks. An additional observation that the article brings to attention is that climate change can not just pose a threat to yields, but also the nutritional value of staple crops- higher CO 2 levels and heat stress are associated with a decrease in protein, iron, zinc and other micronutrients. In addition, the article emphasizes that adaptation will involve a complex response: breeding of heat and drought-resistant varieties of crops, crop diversification, digitalization of weather advice and extension services, and investment in capacity building and climate-smart practices in farmers. To conclude, the article by Choptiany is quite convincing that unless there is a quick intervention to enhance resilience and adaptation of the smallholder systems, the continent faces major setbacks in food security and economic stability.

The report "*Responding to Climate Change*" by the United Nations Environment Programme, Africa Office, although MENA region produces about a quarter of the world greenhouse gas emissions, the country has been one of the most susceptible locations to climate change since it is of low socioeconomic status and high exposure to environmental shocks. It highlights the need to integrate adaptation and mitigation measures, including balance of investments in clean energy and agricultural and ecosystem activities land use, in line with the Paris Agreement. UNEP assists the African countries in adapting the Nationally Determined Contributions (NDCs) into implementable plans, developing National Adaptation Plans (NAPs), and creating policy coherence within the various sectors such as energy, agriculture, and waste. Besides, it enhances youth and informal sector participation with sustainable projects such as bio-fertilizer and fuel briquette manufacturing, considering the climate action as a source of employment and socioeconomic development. Finally, UNEP packages climate response in Africa as a strategic investment opportunity and not an economic burden(UNEP, 2024).

In the article "*Extreme Weather and Climate Change: Population Health and Health System Implications*" by Kristie L. Ebi, Jennifer Vanos, Jane W. Baldwin, Jesse E. Bell et al. (2021), the authors discuss The author discuss the growing role of climate variability and change in extreme weather events (heatwaves, floods, wildfires) and how they are becoming increasingly important to the health and health systems of populations. Despite the fact that death toll in such incidents has been declining over the past decades, the general health hazards are escalating considering the exposure to the populations and the escalating intensity of the hazards. The authors emphasize how difficult it is to deal with the occurrence of the compound events, when several hazards combine to increase the system-wide impacts. They suggest introduction of the health systems that are climate resilient with vulnerability analysis, and disaster risk management, and infrastructure that can withstand extreme circumstances. The research concludes that climate change should be treated as a core issue in the realm of the general public health and health system that should have proactive adaptation and resilience policies (Ebi et al., 2021)

Research Gap

First of all, existing research has shed a lot of light on climate governance in the broader Middle East and North Africa (MENA) region, urban resilience, and adaptation policies. Still, there is barely any research that identifies the MENA region as an area with separable socio-ecological, -political, and -economic dynamics. Most of the time, studies merge North Africa within MENA frameworks that hide the specific vulnerabilities of the region: the lack of water originating from the environmentally impacted area of the Sahara-Sahel, dependence on climate-sensitive agriculture, and rapid urbanisation resulting from weak governance structures. In addition, the existing material (literature) is adopted to highlight adaptation and policy frameworks, but they seldom evaluate the effectiveness of the resilience strategies or the actual participation of local communities in those processes. The pieces of writing researched around do not provide enough information on the comparative and empirical analysis of the national climate actions vis-a-vis the regional frameworks such as the AU's Agenda 2063 or UNEP's adaptation initiatives. Therefore, this research is engaged to do the initial analysis of climate change in North Africa, to comprehend the effects of climate change on sustainable development and peace in the MENA region through a thorough, integrated, and localized approach that uses real-life data.

Research Questions

- North Africa is ranked among the top one percent of the most climate-vulnerable regions globally, what changes cause this environmental fragility of the area?
- To what extent water scarcity, desertification, and food insecurity as climate change impacts are influencing socio-economic stability and development in North African countries?
- What are the different manners of a North African state and a regional organization working to strengthening the climate resilience especially by policy reforms, community adaptation initiative, and international cooperation frame?

Research Methodology

This researcher will use the qualitative research method to analyse the many-sided vulnerabilities that have come about as a result of climate change in North Africa and how the region responds to the climate change in terms of resilience to the increasing problems in the environment. Further focusing on the secondary data source, the study is based on reports and analyses offered by international organizations such as the United Nations Environment Programme (UNEP), the African Union (AU), and the World Bank as well as policy briefs, climate frameworks, and scholarly articles discussing issues of adaptation and sustainability in the region. The qualitative data is based on various and credible sources such as documents on environmental policies, national adaptation strategies and regional plans such as the Agenda 2063 of the African Union and the Africa Climate Initiatives of UNEP. The academic literature and the publications made by the think-tanks give hints into how states in North Africa (Egypt, Morocco, Algeria, and Tunisia) deal with climate vulnerabilities concerning water shortage, food security, and governance. The study attempts to answer the research questions by carrying out thematic analysis in order to come up with the key patterns in different sectors like agriculture, water management, energy transition, and urban resilience. Themes will be looked to aid the study in understanding how national and regional response is coordinated to climate agenda draw from the global community of action as well as how effective they are in building local levels of resilience and capacity to adapt.By so doing, the study provides a holistic way to understand the climate change situation in North Africa, which is apparent in the contribution pattern of regional policies, institutional intervention, and community adaptation to resilience-building and sustainable development in the face of increased climate stressors

Objectives of Research

- A review of the major climate change vulnerabilities in North Africa, in terms of environmental degradation, water shortage, desertification, and their effects on food security and livelihood will be carried out by the researcher.
- The researcher will examine national and regional adaptation policies and frameworks such as those of the Agenda 2063 of the African Union and the UNEP climate resilience as part of evaluating their level of effectiveness in overcoming climate risks.
- The researcher will assess the socio-economic and governance aspects of climate resilience, examining how the institutional capacity, implementation of policies and participation of people affect the adaptation outcomes.
- Alternatively, the researcher will evaluate how the international cooperation and sustainable development programs will empower the resilience and enhance the environmental sustainability among countries of North Africa.
- The researcher will also provide a comparative study of climate resilience policies of the selected North African states like Egypt, Morocco, Algeria, and Tunisia to determine the best practices and the gaps in policy implementation

Historical Context

The context of the past climate changes and human acclimatisation in North Africa is key to understanding the current situations of vulnerabilities and solutions of climate adaptation in the region. The climate of North Africa has historically been arid and semi-arid, with variations and uncertainties in rainfall and

temperatures over time influencing the environment and socio-economic conditions. Climate change has also resulted in communities in the region adapting to these fluctuations by creating their own water-harvesting strategies, seasonal-Agriculture, and other practices, migration, drought resistant agricultural technologies. Both of these procedures helped the populations to provide livelihoods in periods of drought and periodic desertification processes.

The economic development process was basically concerned with achieving the industrialization of North Africa and laying the foundation for the modern urban scale, and neglect the environment of society as a whole. The diversion of water, irrigation schemes and reclaimed land put more strain on natural resources, affecting traditional adaptation mechanisms and hence the vulnerability of the natural resources to environmental stress.

The effects of global climate change, such as rising temperatures, falling precipitation, desertification and sea level rise along the Mediterranean coast, were amplified in North Africa in the late 20th century. The resulting changes exacerbated longstanding vulnerabilities, such as those in agricultural sectors reliant on water supplies and in highly populated urban areas. Combined impacts of environmental stress, SS issues and governance gaps underlined the need for national and regional level coordinated adaptation action.

For the last 20 years, countries in the Northern part of Africa have been accepting Climate Change as a bridge to development and security issues. The increased realization of both the anticipated and coordinated nature of adaptation policies for climate resilience can be seen through the African Union's Agenda 2063 which provides for collaboration on climate policies in the region, as well as national adaptation plans, and international platforms like the United Nations Environment Programme (UNEP). This historical evolution from past traditional indigenous coping to today's policy process shows how the range of environmental, socio-economic and governance factors impact on climate adaptation in North Africa.

Understanding the historical context and bringing the past into the light puts current climate challenges in context and serves as a reminder that new ways of addressing resilience must be rooted in the "indigenous knowledge", and in governance processes of local and contemporary communities to be relevant, sustainable and socially and economically equitable.

Climate Change Vulnerabilities in North Africa

These climate vulnerabilities in North Africa are integrated elements of the difficult environmental conditions and the dependence on the climate-sensitive sectors such as agriculture in the socio-economic field, associated with water scarcity. Due to continuous rise in temperature and decrease of rainfall, desertification has been accentuated,

Loss of productive land, especially in the Sahelian and Maghreb areas, soil degradation. Lack of water is also a major issue, since nations such as Morocco and Algeria heavily depend on restricted water resources for industrial, agricultural and domestic purposes. According to reports groundwater levels are falling, and groundwater resources are being extracted beyond the critical load; the current scenario is likely to have an impact on food production and rural economy.

The effects of extreme events, like heatwaves, flash floods and droughts, worsen these vulnerabilities in pastoralist vulnerable areas in the region. In Egypt the effects of climate change raise the alarm on agriculture as the Nile is a source of water for agriculture where water shortages and salinity constitutes a threat.As climate change continues to happen in Egypt, the sector of water use, which is getting more and more saline, is being affected by water scarcity, thereby undermining food security and the livelihoods of rural communities. Tunisia has been experiencing continuous drought which have led to shortfalls of cereal production and stress (Adom, 2024).

Socio-Economic and Governance Challenges

Some infrastructure and governance related vulnerabilities to climate change in the North Africa region are intensified by institutional and governance challenges. The governance framework is lacking in coherence,

coordination of policies in ministries and participation of local stakeholders is a challenge to implement adaptation.(Olawuyi, 2021). These inequalities in socio-economic status can exacerbate vulnerabilities particularly for people who live in rural and marginalised areas who are unlikely to have access to resources and adaptive technologies or technical assistance.

The pressure on water, energy and waste systems due to urbanization, especially for coastal cities in Africa.Urbanization to put stress on water, energy and waste management systems particularly in densely urbanized coastal cities in Africa. Urban population growth contributes to making urban people more vulnerable to urban climate risks due to limited investment in urban infrastructure: Furthermore, the high percentage of youth unemployment, a reliance on agriculture and the larger portion of young people who remain economically dependent on their farming activities make population vulnerable to climate shocks, increasing instability and migration pressures (Wright, et al., 2024)

National Adaptation Strategies

The national government's integration of climate adaptation is on the rise in North African

countries with this success rate varying. The National Adaptation Strategy for Egypt emphasizes climate adaptable methods in water use patterns, diversification of crops and the added value of renewable energy. The strategy of Morocco is based on integrated water resources management, investment in drought resistant crops, promotion of solar and wind energies in the context of “Green Morocco”. Like Tunisia and Algeria, water is also an area in which the state shows a high priority.

However, there are substantial governance challenges and limited local co-operation and funding for adaptation, especially. But policies at the local level have been drafty, and implementation of these policies at the local level often is inadequate, and this is where it is most apparent that policies are needed.

Regional and International Governance Frameworks

Regional cooperation is one of the key components of building regional resilience. There are frameworks that provide strategic direction for coordinated climate adaptation in the North African states, such as the Agenda 2063 of the African Union, and the Africa Climate Initiatives (ACInitiatives) of the United Nations Environment Programme (UNEP); (Fonjong et al., 2024). Particular focus is given to integrated resource management, national policies and international climate targets and cooperatives at international level.

Paris Agreement

But, there are gaps in taking regional approaches into actionable measures. Regional adaptation strategies are less effective, due to retrofit and transformation in other states, and to limited technical capacity at a national level, and different funding processes. Moreover, the participation of local knowledge systems and the marginalised communities is still insufficient, and present when not in a proper way, limiting the potential for developing solutions which are specific to the socio-economic and environmental realities on the ground.

Community and Indigenous Adaptation Practices

Throughout North Africa, local adaptation strategies have been practiced to deal with climatic stress. Water harvesting, terrace farming, using drought-resistent seeds and migration between seasons are common approaches to addressing environmental risks. These practices could give protection and adaptability at local level but if these are incorporated in national and regional policies, resilience and sustainability at larger levels could be achieved. Combining MKs with modern scientific approaches is suggested to be more effective in lange-lasting resilience, as per some evidences (Nour, 2023).

Key Challenges and Opportunities

The analysis identifies a number of constraints on climate resilience in North Africa.

- Governance fragmentation: Coordination gaps between ministries and local authorities reduce policy efficacy.
- Limited stakeholder participation: Marginalized populations and local communities are often excluded from planning and decision-making.
- Financing constraints: Limited investment of adaptation projects decreases scalability and effectiveness.
- Sectoral siloing: Inadequate socio-sectoral coordination of water and agricultural, energy and urban planning policies decreases the adaptive potential.

The main opportunities for increasing resilience, however, include:

- Institutionalized/coordinated governance mechanisms between national, regional and global levels initiatives.
- Community based inclusive adaptation planning using local knowledge and participatory processes.
- Investment in Renewable Energy and Technologies that save water, by reducing climate dependency and vulnerability.
- Cooperation on cross-border water resource management and on climate risk monitoring.

Policy Implications

The results of the current study have a number of implications for policy makers, regional citizen organizations and international development partners in North Africa interested in improving climate resilience:

1. Improve governance and institutional coordination; lack of coordination at the institutional and sectoral level is an obstacle for implementing adaptation measures. Ensure coherence in policy making, interministerial coordination and the presence of dedicated climate adaptation units in the various ministries involved to implement policies in a coherent way.(Olawuyi, 2021).
2. Invite Community Involvement and Local Solutions: Community engagement is important in effective resilience strategies, and incorporate indigenous knowledge systems. Strategies should focus on participatory planning, beneficiary-led initiatives and training of capabilities at the community level to both increase the relevance and promote sustainability of adaptation actions.
3. Can Mobilise Finance and International Support: Often limited funding and constrained adaptation efforts. Financial mobilization through public-private partnerships (PPS), climate finance mechanisms, and debt re fundraising measures can be improved by governments and regional organisations.Governments and regional organisations can strengthen financial mobilization via public-private partnership, climate finance mechanisms, and debt re fundraising measures.
4. Donor initiated adaptation projects and donor financed adaptation projects. Addressing the unequal allocation of resources to promote equal access and benefit, both nationally and locally, will enhance adaptation.
5. Strengthen Regional Cooperation: Water scarcity, desertification and extreme weather events are a matter of trans-border concern. Policymakers should find ways to enhance cross-border projects, exchange data and technology, and align regional climate agendas under various collaborative platforms such as Agenda 2063 to deliver region-wide climate resilience outcomes.

These policy suggestions can enhance the region's climatic resilience, foster socio-economic benefits and advance regional cooperation and sustainability when incorporated into North Africa states' policies.

Comparative Analysis of Climate Resilience in North African States

This comparative analysis of the four countries (Egypt, Morocco, Algeria and Tunisia) demonstrates

the diversity of strategies strived to implement to tackle climate change adaptation at country level which is already seen in the design, governance and implementation of the policies.

Egypt

Egypt's climate vulnerability is intricately tied to the Nile Basin water scarcity, as well as before-mentioned Sea Level Rise in the Nile Delta. The water management, water utilization efficiency, and implementation of renewable energy are highlighted in the National Adaptation Strategy. Though Egypt's policy is well in place, implementation has been inconsistent in certain parts of the country, especially in rural areas where resources and technology is more.

Morocco

In the Maghreb, Morocco has been acting proactively, in line with the national development plan of Green Morocco and its investments in renewable energy sources, for which solar and wind energy resources are the largest components. The policy framework is advanced in the field of integrated water resources management, in rational programs of drought resistant crops, as well as in sustainable urban planning. But financial limitations and differences across regions persist, posing an obstacle to equitable adaptation results (Desmidt, 2021)

Algeria

Governance issues obstruct adaptation efforts, and Algeria is suffering from broad-scale desertification and farming problems. Nationalth strategies centre around water conservation, reforestation and renewable energies, however there is often lack co-ordination of policies at the ministry and local authority level. There is limited community involvement in adaptation planning, limiting local resilience(Olawuyi, 2021).

Tunisia

Tunisia's focus is both on adaptation, particularly for agriculture, and coastal protection. Development of promotion schemes for water saving technologies and drought tolerant crops and awareness raising campaigns. Local government experience and capacity gaps and a lack of involvement in local processes across Tunisia hinder plans from transforming into action, especially in rural areas.Tunisia has good policy targets, but poor local government involvement and experience means that they are not yet being realised in practice, particularly in the rural areas.

Comparative Insights:

- Morocco is showing the most integrated knowledge on energy transition and water management.
- The challenge for Egypt is to translate the national approach to resilience into local approach to resilience.
- There are shortcomings in terms of governance and participation which obstruct the implementation of policies in Algeria and Tunisia.
- In all countries limiting resources and coordination across sectors decrease the effectiveness of adaptation policies.

Discussion

As the results of the comparative analysis show several common points:

- Governance and Institutional Capacity: Resilient persons rely on the effectiveness in governance structures. Crackdowns among institutions and lack of coordination between sectors, thereof, limbs decreases adaptations efficiency. Countries such as Morocco, with a policy integrating approach, show a greater level of consistency between the national level and implementation.
- Indigenous Knowledge and Community Participation: Water harvesting and introducing drought-resistant agricultural methods or techniques produce a longer-term resilience if they are based on

local knowledge. Poor policy implementation because of low level of community participation across the region.

- Access to resources for adaptation: Vulnerable socio-economic groups in rural areas with restricted access to adaptation resources. But budget limitations affect the magnitude and viability of resilience initiatives: targeted investment and international collaboration are crucial.
- Regional Cooperation: Regional instruments such as the African Union agree 2063, UNEP Africa Climate Initiatives, and programmes offer strategic guidance for cross-border cooperation. But the challenge that the regional policies need to be translated into national and local actions is persistent, however.
- Integration with Sustainable Development Goals: Enabling climate resilience needs socio-economic development to be conducive. Policies that only pave the way towards adjusting to climate change without considering economic equity, health and livelihoods are less effective.

The results show that adaptation strategies which are not integrated, just contextually positioned, and inclusive are essential for enhancing the resilience. A cross-country comparison indicates that a successful national level policy, regional cooperation, financial investment and community involvement combination would lead to the prospects for the best results.

Conclusion

Climate change presents many risks to North Africa, for example low water availability in the region, desertification, food stress and socio-economic fragility. These policy bases are provided by national and regional level frameworks like the National Adaptation Strategy (Egypt), the Green Morocco Plan (Morocco) and Agenda 2063, but the policies and plans are made with insufficient local involvement, lack local funds, and fragmented governance.

The study raises the needs for inter-sectoral strategies and action comprehensive and coherent strategies which combine the adaptation of the environment, socio-economic development, institutional development and participative governance. Boosting regional cooperation and resource mobilization and building in regional integration.

It is important to incorporate indigenous knowledge systems to contribute to resilience in order to have a sustainable development in the context of growing climatic threats.

Finally, the effective implementation of climate resilience in North Africa will need policies to be integrated, inclusive, context-specific and evidence based, which takes into account the environmental, social and economic concerns. North African countries can enhance their ability to adapt to climate change, minimize vulnerability and support regional stability and sustainable development in the context of the governance gaps and increasing engagement of the community.

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