YOUTH POLICY CENTER

POLICY BRIEF

MOROCCO'S WATER STRATEGY

IN THE AGE OF CLIMATE UNCERTAINTY

JIHANE AKIF
Analyst - The Economic Research Committee
j.akif@youthpolicycenter.org

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Introduction

Once known for its agricultural richness and climatic diversity, Morocco is at the forefront of the global climate crisis. From the Rif and Atlas Mountains plateaus to the arid fringes of the Sahara, the country's natural landscape is undergoing rapid and alarming changes. As rising temperatures and prolonged droughts reshape Morocco's environment and economy, water scarcity is no longer a distant threat and it's becoming a reality that has started to affect livelihoods, food security, and economic stability.

For the Moroccan case, the IMF estimates that investment in climate adaptation infrastructure yields a better and higher economic return compared to an investment of the same magnitude in standard infrastructure. Their model shows that investing in climate-resilient irrigation infrastructure could reduce Morocco's drought-related GDP losses by nearly 60%, significantly enhancing economic resilience. This confirms the need for a long-term climate adaptation policy that would help Morocco face the water crisis given its interconnection with Morocco's macroeconomic performance.

In light of this situation, this policy brief examines the growing water crisis in Morocco and its impacts on agriculture, livelihoods, and macroeconomic stability. It reviews the current government efforts to address water scarcity and identifies critical areas where further policy action and investment are needed. The policy brief aims to provide concrete recommendations to strengthen Morocco's long-term water resilience strategy, particularly by enhancing the effectiveness of existing programs and ensuring that water scarcity becomes a central criterion in sectoral planning and development.

Rising Pressures: Water Scarcity and its Economic Impact

North Africa is characterized by an arid baseline climate, with low rainfall and high evaporation rates, making it exceptionally sensitive to climate shifts. The northwest of Africa, where Morocco lies, has higher risks of drought due to a significant northward shift of both the Sahara and the Sahel[1]. On the other hand, the Mediterranean region is warming 20% faster than the global average[2] and according to the Regional Climate Change Index (RCCI)[3] the Mediterranean region is a very responsive region to climate change (considered a Hotspot). In recent years, Morocco has experiencing water stress with renewable internal freshwater resources per capita dropping significantly, from an average of 2166 m^3 per capita in the period 1961-1970 to an average of 825 m^3 per capita for the period 2012-2021[4]. Bridging the gap between water supply and demand over the coming decades became a necessity since Morocco's water deficit is currently estimated at 1.8 billion m^3/year and could reach 7 billion m^3/year by 2050, considering climate change effects.

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[1] Tian, C., Huang, G., Lu, C., Song, T., Wu, Y., & Duan, R. (2023). Northward shifts of the sahara desert in response to twenty-first-century climate change. *Journal of Climate*, *36*(10), 3417-3435.
[2] United Nations Environment Programme. (n.d.). *Climate change*. UNEP/MAP. https://www.unep.org/unepmap/resources/factsheets/climate-change
[3] Regional Climate Change Index (RCCI) over 26 land regions of the World, it is a comparative index that identifies the regions most responsive to climate change (Modified from Giorgi, 2006). https://pastglobalchanges.org/science/wg/former/regional-integration/intro
[4] Based on Data from the World Bank, Climate Change Knowledge Portal (2021)

In 2023, Morocco registered an anomaly temperature reaching an annual average of 1.77 compared to the period 1981-2010[5], and the year 2024, is considered the sixth consecutive year of drought in modern times. The direct impact is seen in the agriculture sector, a vital sector in Morocco's economy that employs 33% of the population. Cereal production dropped by over 40% below average in 2024 due to a particularly poor harvest, leading to a 30% increase in cereal imports compared to the average, to compensate for domestic shortages.[6].

The World Bank report[7] highlighted the strong correlation between rainfall patterns and agricultural performance in Morocco. Agriculture, a sector heavily rainfed, accounts for approximately 13% of Morocco's GDP and 23% of its exports. The study confirms that irregular rainfall continues to be a significant source of macroeconomic volatility in Morocco. Empirical evidence shows that rainfall shocks explain about 37% of Morocco's production variance in the medium term. The analysis also demonstrates that drought episodes exacerbate vulnerability in rural areas, leading to a significant income loss and increase dependence on cereal imports, threatening national food security.

Recently, following the consistent drought and its proven impact on agriculture production and inflation rates, the Moroccan government has taken a few short-term measures to address the water drought such as restrictions on water use in urban areas and cancellation of Eid-Adha due to the penury of meat products. However, those measures are insufficient to face the water structural deficit. The need for long-term plans and a strengthen infrastructure has become more urgent than ever.

Current Strategies and Long-Term Water Planning

Since the 1960s, Morocco has pursued a dam policy, constructing 135 large dams with a total capacity of 17.5 billion cubic meters. Additionally, since 1995, significant investments have been made to address water shortages, particularly through the development of desalination plants, bringing installed capacity to 220 million m^3/year by 2022. Currently, these efforts are not enough to face Morocco's water challenges and to cope with growing demand and environmental pressures. The current infrastructure is deteriorating with dam inflows dropping by nearly 20%, groundwater levels falling by over 2 meters annually, and severe pollution from domestic, industrial, and agricultural sources degrading water quality.

Today, Morocco has no choice but to adapt and rethink its water strategy to prevent future failures in meeting the country's growing water needs. To tackle this challenge, Morocco has launched an ambitious water investment plan named the National Program for Drinking Water Supply and Irrigation (PNAEPI, 2020-2027), with a budget of 143 billion dirhams[8]. This initiative is part of the broader National Water Plan (PNE, 2020-2050), which sets the country's long-term water management strategy over the next 30 years.

The National Program for Drinking Water Supply and Irrigation (PNAEPI, 2020-2027) addresses both the supply and demand sides of water management to ensure sustainable water

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[5] Direction Générale de la Météorologie. (2024). *État du climat au Maroc en 2023*.
[6] Food and Agriculture Organization of the United Nations. (n.d.). *Morocco*. Global Information and Early Warning System (GIEWS). https://www.fao.org/giews/countrybrief/country.jsp?code=MAR
[7] World Bank Group. 2022. Rapport sur le Climat et le Développement au Maroc. CCDR Series.
[8] Budget citoyen Loi de finances 2024

resource utilization. The strategy main objective is balancing water supply and demand through a variety of measures.

On the supply side, the policy focuses on developing new water resources through constructing of approximately 60 large dams by 2030 and creating interconnected water systems between regions to decrease resource inequality. This north-to-south water transfer will support socio-economic development in water-stressed basins such as Bouregreg, Oum Er Rbia, and Tensift. Additionally, the plan promotes small and medium-sized dams, rainwater harvesting, and non-conventional resources like seawater desalination and treated wastewater reuse[9].

On the demand side, the policy emphasizes efficient water management and valuation, particularly in agriculture, being a major consumer of water. Key initiatives include converting to localized irrigation, enhancing water distribution network efficiency, promoting volumetric pricing, and educating farmers on water-saving techniques[10]. . The national policy emphasizes environmental protection and improved water governance. It aims to safeguard resources like aquifers, oases, and wetlands, while also enhancing institutional capacity, coordination, regulatory mechanisms, and financing through diverse sources.

Significant progress has been made under Morocco’s 2020–2027 National Program for Drinking Water Supply and Irrigation (PNAEPI), including the expansion of desalination capacity (from 8 to 15 stations), the construction of new dams, and the commissioning of key interconnection projects. However, several components are still facing delays, particularly the completion of major dams like M’dez, Targa Ou Madi and Sakia El Hamra (construction began before 2020), large-scale desalination plants such as the one planned for Casablanca, and the full rollout of wastewater reuse in agriculture. These delays are compounded by financing challenges, high water treatment and transport costs, and an insufficient regulatory framework for alternative water use.

Recommendations for action

This policy is ambitious and builds on decades of previous infrastructure efforts but also represents a bold step towards building a climate adaptation long term policy to mitigate the risks in the country.

There is a need to coordinate these efforts and measures with other sectoral reforms, specifically in the agriculture sector. Water scarcity should be the main variable and the focus in approving agricultural investments, this would help rationalize the withdrawal of the renewable share of water resources. This could be complemented by the promotion of low water footprint agricultural production, along with continued support for drip irrigation given its high efficiency and productivity.[11]. Encouraging investments in innovations such as hydroponics[12], which can use up to 90% less water than traditional farming methods and other technologies such as vertical farms, solar-powered irrigation systems and superhydrophobic sand mulches[13].

[9] The goal is to mobilize an additional 2.5 billion m³/year through supply-side actions to support industry, irrigation and drinking water
[10] These efforts are projected to save around 2.5 billion m³/year of irrigation water
[11] According to world bank, irrigated areas represent only 20% of cultivated land, they generate 53% of agricultural value added, making them over four times more productive per hectare than rainfed areas.
[12] The process of growing plants in sand, gravel, or liquid, with added nutrients but without soil
[13] Superhydrophobic sand mulches are treated sand layers that repel water, reducing evaporation and helping retain soil moisture in arid agricultural environments

One of the main goals of such policies is to establish a sufficient system. At this stage, it is important for the government to take into account the rebound effect of water efficiency measures proposed and prepare scenarios to control the net water consumption. The policy should aim to balance technical solutions with adaptive measures. In this scenario, farmers are incited to shift to water-intensive, high-value crops when irrigation systems are modernized, intensifying groundwater exploitation. This raises the question of reviewing the water tariffs and adjusting them to reflect the scarcity of water, thereby incentivizing more rational use of resources. The adjustment of tariffs (redevance du domaine public hydraulique (DPH)) could target private irrigation, which often relies on rapidly depleting groundwater resources.

These measures accompanied by complementary efforts such as communication, awareness campaigns and ecosystem preservation could help control the growing demand and hold all the stakeholders accountable and help PNE's bridge the water supply-demand gap by 2050.

Conclusion

While recent rainfall in Morocco has offered temporary relief and helped replenish some water reserves, it should not be mistaken for a resolution of the country's deeper, structural water crisis. The short-term alleviation of pressure on dams and groundwater is needed, but it remains far from sufficient to close the country's growing water deficit and the country cannot afford to rely on occasional rain to ensure long-term water security.

To build resilience, it is crucial for Morocco to accelerate the implementation of its long-term water strategy, focusing on integrated climate adaptation, sustainable water use, interconnected water systems and stronger inter-sectoral coordination. It is equally vital for the Moroccan authorities to ensure rigorous monitoring and evaluation of all projects to guarantee that the ambitious goals of the PNE 2050 are met. Without consistent follow-up, accountability, and adaptive management, even the most well-designed policies risk falling short in the face of escalating environmental and socio-economic challenges.

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