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Water Security in Jordan: Causes, Constraints, and Policy Pathways

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Executive Summary

Jordan is facing a structural water crisis that can no longer be explained by the scarcity of natural resources or climatic and population pressures alone, in fact, it has become directly linked to the governance structure, weak negotiating power, and postponing the long-term sovereign decision on resource management. The per capita share of renewable freshwater is about 61 cubic meters per year, which is a very low level compared to the internationally recognized scarcity threshold of 500 cubic meters per person per year.[1] This reality places the water sector at the heart of the national stability equation, with its increasing impact on economic, service, and sovereign decisions. In light of the current weak water management conditions, this situation could turn into a real threat, especially due to a range of factors that have directly affected water resources.

Internally, the water resources situation is affected by weak operational management, declining efficiency of dams and storage, accelerating population and economic pressures, along with the expansion of unsustainable extraction and the absence of effective deterrence against illegal use. The deterioration is also linked to high water loss rates in the networks, uneven distribution between governorates, and widening water equity gaps between urban and rural areas. Low-income households bear a higher financial burden for intermittent and inconsistent quality services, adding a direct social dimension to the crisis.

A clear imbalance also emerges in the allocation of water resources across sectors, with the agricultural sector consuming the largest share of water resources while contributing relatively little to the GDP, estimated at around 6–7%.[2]This reality necessitates a review of allocation priorities and the efficiency of the economic return per cubic meter used, and directly links water policies to production, food, and labor market policies.

These challenges are exacerbated by external factors, most notably climate change and water geopolitics, turning the issue into a national security concern, especially since Jordan shares about 26% of its water resources with neighboring countries.[3] The combined effect of these elements has had a profound impact on food security, rural stability, the quality of urban services, energy costs, youth employment opportunities, and social justice, making water management a key factor in the stability of the state as a whole. Transboundary water agreements are a pivotal element in the structure of the crisis, as there is a clear imbalance in the level of actual commitment to the terms of water sharing, especially in the context of the 1994 peace treaty, which did not guarantee Jordan stable shares as stipulated, which prompted the state to seek

[1] Ministry of Water and Irrigation. (2023). National water strategy 2023–2040: Summary. Hashemite Kingdom of Jordan. https://www.mwi.gov.jo/EBV4.0/Root_Storage/AR/EB_Ticker/National_Water_Strategy_2023-2040_Summary-English_-ver2.pdf

[2] UNICEF and Economist Impact, *Tapped Out: The Costs of Water Stress in Jordan* (Water Stress in Jordan Report), 20 July 2022, United Nations – Jordan website, see: https://jordan.un.org/sites/default/files/2022-07/water%20stress%20in%20Jordan%20report.pdf?utm_source

[3] Ministry of Water and Irrigation. (2022). *Jordan water sector – Facts and figures 2022*. Hashemite Kingdom of Jordan. https://www.mwi.gov.jo/ebv4.0/root_storage/ar/eb_list_page/jordan_water_sector_-_facts_and_figures_2022.pdf

emergency and costly alternatives to cover the deficit. In addition, many analyses indicate that these arrangements were not entirely fair in distributing water benefits between the two parties.

One of the fundamental problems lies in the weakness of national negotiating capacities, both in managing shared basins and in international climate finance platforms. Water issues are often treated as purely technical matters, which weakens the ability to impose fair terms or transform crises into strategic and financial opportunities. This is clear in cases such as the Disi aquifer, the absence of legally binding protocols for water management, and the limited capacity to develop a unified negotiating strategy that integrates legal, economic, and climate dimensions.

Also, Jordan's small size within the international system limits its ability to maneuver on sovereign issues and reinforces its financial dependence on international institutions, thus weakening its independence in setting water policy priorities; this dependence is reflected in the link between the implementation of major projects and the conditions of external funding, as well as in the limited capacity to build regional negotiating alliances that support Jordan's water rights.

Therefore, water security in Jordan is no longer merely an environmental challenge or a matter of service provision; it has become a postponed sovereign decision, the economic, political, and social costs of which accumulate over time. The ongoing crisis imposes enormous financial burdens on the public budget due to reliance on deep-water pumping, high-cost energy, and the financing of desalination and transportation projects, in addition to the political costs associated with dependence on donors and de facto regional cooperation.

Based on this, the paper proposes three integrated policy paths

First: Large-scale desalination is the most prominent strategic option for enhancing long-term water supplies, spearheaded by the National Water Carrier Project; this project can provide a sustainable water source and reduce reliance on shared resources, but it requires substantial investments and accompanying reforms in governance, energy, and water loss.

Second: Expanding the reuse of treated wastewater in agriculture is a medium-cost, medium-time option that alleviates pressure on freshwater resources and improves the efficiency of sectoral allocation. However, it requires regulatory oversight and building public trust.

Third: Demand management and public awareness campaigns are complementary, low-cost, and rapidly implementable options aimed at reducing consumption and improving efficiency. However, they are insufficient on their own to address the structural deficit.

The key issue is not choosing between these paths, but rather building a strategic sequence that combines them, starting with reforming governance and reducing waste, expanding reuse, and investing long-term in desalination, in parallel with rebuilding the national negotiating apparatus and reducing financial dependence.

In this context, the National Water Carrier Project (Aqaba-Amman Desalination Plant) is the most prominent strategic option for enhancing long-term water supplies, as it is expected to cover approximately 45% of municipal water demand by 2040.[4] However, its effectiveness will remain contingent on reducing the high water losses and reforming governance to ensure that these supplies translate into genuine water security.

The paper concludes that the cost of inaction in the water sector may ultimately exceed the cost of any available investment option. Accordingly, it proposes a set of phased policy approaches, prioritizing a strategically viable and time-bound solution as the least costly option in the long term.

[4] Green Climate Fund, "Red Sea Water Desalination and Transfer Project – Aqaba to Amman (FP288)," Green Climate Fund, last updated 30 October 2025, accessed 18 February 2026, see: https://www.greenclimate.fund/project/fp288?utm_source.

Introduction: From resources scarcity to a threat to national security

Jordan's water crisis has transformed from a technical challenge linked to resource scarcity into a structural threat affecting national security and the stability of the state on social, economic, and political levels. Accordingly, with limited water resources, rapid population growth, and a persistently unstable regional environment, water insecurity has become a pressing factor reshaping state priorities and affecting its ability to govern and provide essential services.[5] Moreover, the crisis's repercussions extend to deepening social inequality and unequal water distribution between governorates, as well as increasing losses in the water network, thus entrenching water equity gaps. This also influences food security by restricting agricultural production and increasing reliance on imports and raises energy costs due to dependence on energy-intensive pumping, treatment, and desalination technologies; these costs represent approximately half of the water sector's expenses and nearly 15% of Jordan's total electricity consumption. Ultimately, these combined pressures contribute to weakening public confidence in the state's ability to manage its vital resources and ensure the sustainable provision of essential services.[6]

Therefore, water insecurity in Jordan is not reduced to being an environmental problem or an infrastructure defect, but rather it goes beyond that to act as a threat multiplier, exacerbating existing structural vulnerabilities and testing the ability of state institutions to withstand and be flexible in the face of accumulated pressures.

This paper argues that treating water in Jordan as a purely technical service sector limits understanding its strategic dimensions and marginalizes its role within the national security and sovereignty framework. Confining water governance to operational efficiency and externally funded projects overlooks the political economy of decision-making, accountability mechanisms, and the requirements of long-term planning. From this perspective, the persistence of water scarcity is not solely attributable to natural factors or external pressures but is also linked to delays in making sovereign decisions and the repeated postponement of strategic choices necessary for the sustainable management of water resources.

Although rising demand and limited renewable resources are key structural factors, the severity of the crisis has been exacerbated by years of fragmented responses, reliance on short-term containment measures, and avoidance of necessary but politically sensitive decisions. In addition, the severe deterioration of the Jordan River-affected by climate change and the practices of upstream countries-also represents an additional constraint on Jordan’s sovereign ability to manage its transboundary water resources, reflecting the overlap between the environmental

[5] United Nations Children’s Fund (UNICEF). (2019). *Jordan’s WASH top facts* (17 January). UNICEF Jordan. https://www.unicef.org/jordan/sites/unicef.org.jordan/files/2019-03/UCF-WASH%20in%20JOR-Top%20Facts-D4%2017%20Jan%202019.pdf

[6] World Bank. (2019). *Jordan—JO Energy & Water Sector Reforms development policy loan (DPL)* (Implementation Completion Report Review ICRR0021535). World Bank. https://documents1.worldbank.org/curated/en/532471561641076061/pdf/Jordan-JO-Energy-Water-Sector-Reforms-DPL.pdf

dimension and geopolitical considerations in the national water security equation.

Furthermore, transboundary water agreements, including the 1987 Jordan-Syria agreement on sharing the waters of the Yarmouk River, and the arrangements contained in the 1994 peace treaty, have not resulted in guaranteeing stable or equitable shares for Jordan, deepening reliance on costly alternatives such as purchasing additional quantities or turning to desalination and strategic transport projects.[7] Instead of pushing these developments towards a comprehensive recalibration of the national water strategy, they have often resulted in reactive policies that postpone structural reform in favor of temporary solutions, increasing the political and financial cost of the crisis over time, whether through increased dependence on external financing or escalating social pressures related to resource allocation.

Accordingly, this paper situates the water crisis within a broader analytical framework that focuses on governance delays and hesitation in sovereign decision-making. It argues that the absence of decisive, comprehensive, and timely state intervention has transformed water scarcity into a chronic condition with cumulative effects on economic sustainability, social cohesion, and the legitimacy of the political system. By approaching water security as a political and strategic issue, the study seeks to demonstrate how the postponement of decisions in the water sector poses long-term risks to national stability and the state's resilience and capacity to cope.

Main causes of the water crisis

Water insecurity in Jordan cannot be adequately understood as a temporary imbalance between supply and demand, nor as a transient consequence of climate fluctuations or demographic pressures. Rather, this situation is structurally reproduced through a set of interconnected dynamics that embed scarcity at the very heart of the political economy. These dynamics extend across environmental, geopolitical, and sectoral spheres, generating a state of persistent vulnerability that resists short-term policy solutions. This vulnerability manifests itself in high water losses and inefficient distribution networks, which limit the impact of any expansion in supply. These structural mechanisms continuously reproduce water insecurity, which explains the limited effectiveness of gradual or reactive interventions, and highlights why partial or ad hoc approaches have failed to bring about sustainable correction in this sector.

1. Persistent Water Scarcity

Jordan is classified among the world's poorest countries in terms of per capita renewable water share, a situation that reflects not temporary pressure but rather a deeply entrenched structural scarcity. The clear gap between Jordan's annual per capita share and that of neighboring

[7] United Nations. (1994). *Treaty of peace between the State of Israel and the Hashemite Kingdom of Jordan* (26 October 1994). United Nations Peacemaker. https://peacemaker.un.org/sites/default/files/document/files/2024/05/il20jo941026peacetreatyisraeljordan.pdf

countries cannot be ignored. However, instead of making a direct comparison with countries that differ radically from Jordan in terms of geography and resource availability, a historical comparison within the Jordanian context seems more accurate for understanding the trajectory of water depletion. According to the Jordanian government, the per capita share has declined from 3,400 m³ in 1946 to approximately 61 m³ annually in 2021, and it is expected to reach 35 cubic meters per year in 2040(8)[8], which is among the lowest rates globally in light of unprecedented water pressures, chronically strained infrastructure, and regional political interventions that make water management a matter directly related to national security and long-term strategic planning.

Thus, the crisis does not reflect merely a circumstantial gap, but a historical trajectory of cumulative structural decline in per capita share, highlighting the lack of long-term water stability in Jordan. Climate change is exacerbating the structural nature of Jordan's water crisis through rising temperatures, declining rainfall reliability, and increased evaporation rates; this not only reduces water supplies but also weakens long-term forecasting and planning capabilities. Accordingly, with the Kingdom heavily reliant on rainfall, the climate pattern has become more volatile and less stable, complicating the development of stable water policies amidst increasing uncertainty and recurring environmental shocks.

Meanwhile, rapid population growth, urbanization, and industrialization have intensified pressure on available resources through the overexploitation of groundwater basins and pollution of water sources, along with operational imbalances such as high water loss and inefficient distribution networks. While available water resources are only sufficient to meet the needs of approximately two million people, Jordan's population has now reached nearly eleven million due to successive waves of migration, particularly from Palestine and Syria, which widened the gap between resources and actual consumption, transforming water from a daily service into a critical issue affecting social and economic stability and the state's ability to meet basic needs.

Thus, water insecurity is no longer an emergency that can be contained, but rather a structural pattern in which scarcity is normalized and institutionalized, becoming increasingly difficult to reverse over time. This trajectory is accompanied by accumulating financial and political costs, given the growing reliance on expensive solutions such as deep pumping and desalination, in the face of limited public resources and the state's capacity for financial sustainability.

2. Dependence on External Water Sources

Structural scarcity is exacerbated by the high degree of external dependence that characterizes Jordan's water situation. More than a quarter of the country's water resources are linked to

[8] Ministry of Water and Irrigation. (2023). *National water strategy 2023–2040*. Hashemite Kingdom of Jordan. https://www.mwi.gov.jo/EBV4.0/Root_Storage/AR/EB_List_Page/national_water_strategy_2023-2040.pdf

shared transboundary water basins[9], including the Jordan River Basin, the Yarmouk River Basin, and several shared groundwater basins which makes national water security partially contingent on the political behavior and strategic calculations of neighboring countries.

This dependence transforms water from a matter of domestic policy into a geopolitical variable, subject to imbalances of power, regional instability, and shifting diplomatic alignments.

Jordan has three main rivers: the Jordan River, whose waters are highly saline, making them unsuitable for drinking or irrigation; the Zarqa River, which receives large quantities of municipal, industrial, and agricultural wastewater, rendering it unsuitable for domestic or agricultural use during the dry season, with its water quality improving only during flood periods; and the Yarmouk River. Additionally, the Jordan River, in its northern and southern sections, historically and religiously significant, now stands as a mere dwindling waterway. The reasons for its decline reflect the growing importance of regional conflict over water resources, where both the Jordan and Yarmouk Rivers have suffered extensive depletion due to water diversions and excessive pumping by upstream countries, particularly Syria and Israel.

The 1994 peace treaty between Jordan and Israel stipulated water arrangements that included supplying Jordan with approximately 50 million cubic meters of water annually.[10] However, linking a significant portion of Jordan's water security to external contractual and political arrangements remains a structural factor that restricts its water sovereignty and subjects it to the fluctuations of the regional context.

This effectively means that Jordan's water sovereignty is limited for several reasons:

First, because the amount of water Jordan receives can be affected by political tensions and the level of commitment from the other party;

Second, because Jordan is sometimes forced to compensate for shortages by purchasing additional water at a high financial cost;

Third, securing these supplies is not merely a technical matter, but is linked to political balances and regional diplomatic relations.

In this context, water cooperation has not remained confined to the 1994 ceiling, In 2021, an additional agreement was signed to purchase an additional 50 million cubic meters annually, raising Jordan's total water supply to approximately 100 million cubic meters annually in some

[9] Ministry of Water and Irrigation. (2022). *Jordan water sector – Facts and figures 2022*. Hashemite Kingdom of Jordan. https://www.mwi.gov.jo/ebv4.0/root_storage/ar/eb_list_page/jordan_water_sector_-_facts_and_figures_2022.pdf

[10] United Nations. (1994). *Treaty of peace between the State of Israel and the Hashemite Kingdom of Jordan* (26 October 1994). United Nations Peacemaker. https://peacemaker.un.org/sites/default/files/document/files/2024/05/il20jo941026peacetreatyisraeljordan.pdf

years.[11] New approaches have subsequently emerged to overcome this constraint, including the "Water for Energy" initiative; this initiative based on indirect regional arrangements to expand water supplies in exchange for renewable energy projects, reflecting a Jordanian attempt to reduce its water vulnerability through broader barter agreements.[12]

Currently, Jordan receives only between 55 and 60 million cubic meters of water annually via a newly constructed pipeline,[13]the profound negative effects of which are felt throughout the country. Indeed, despite numerous agreements signed between Israel, Jordan, and Syria regarding water resource sharing, these agreements have not been fully implemented, primarily by Israel, negatively influencing the stability of Jordan's water supply.

The reliance is not limited to the 1994 agreement but also extends to the 1987 Jordan-Syria agreement on sharing the waters of the Yarmouk River. However, this agreement also suffers from a number of gaps and other weaknesses, indicating that it continues to hinder the emergence of a fair and sustainable arrangement for transboundary waters.[14]

In this context, water sovereignty appears inherently constrained as Jordan's ability to secure and manage its water resources independently is limited not only by technical expertise but also, and primarily, by external political structures over which the state exercises limited control. This results in constant exposure to external shocks-whether diplomatic, military, or economic-that can disrupt access to water without warning, thus embedding water insecurity at the heart of state planning and making it a structural element of the national stability equation.

3. Water Distribution Imbalance among Economic Sectors

An additional dimension of structural fragility lies in the chronic misallocation of water among different economic sectors. The agricultural sector consumes the largest share of water resources in Jordan, while contributing only a relatively small percentage to the GDP, approximately 6.9%. [15]This imbalance reflects not merely a lack of efficiency, but rather a structural distortion in resource allocation, shaped by historical policy choices, subsidy systems, and political sensitivities that have prevented the restructuring of this sector to align with the existing water realities.

This imbalance is particularly evident because the continued allocation of the largest share of water to agriculture often comes at the expense of municipal and industrial uses, which are more closely linked to basic needs and urban economic growth, where this is especially true given that

[11] Petra. (2021, July 14). *Jordan to receive 50 million cubic meters of water under agreement with Israel*. Jordan News Agency. https://petra.gov.jo/Include/InnerPage.jsp?ID=35975&lang=en&name=en_news

[12] Konrad Adenauer Stiftung. (2022). *The Jordan, Israel, and UAE water-for-energy deal*. Konrad Adenauer Stiftung. https://www.kas.de/documents/279984/280033/The%2BJordan%2BIsrael%2Band%2BUAE%2BWater-for-energy%2BDeal.pdf

[13] Al-Kharabsheh, A. (2020). Challenges to Sustainable Water Management in Jordan. *Jordan Journal of Earth & Environmental Sciences*, *11*(1).

[14] Zeitoun, M., Abdallah, C., Dajani, M., Khresat, S. E., Elaydi, H., & Alfarra, A. (2019). The Yarmouk tributary to the Jordan River I: Agreements impeding equitable transboundary water arrangements

[15] Petra News Agency. (2025, April 7). Agricultural sector contributes 6.9% to Jordan's GDP in 2024

the industrial sector achieves the highest economic return per cubic meter of water consumed, while the agricultural sector achieves the lowest.[16]

Furthermore, deficiencies in the capacity to treat industrial and municipal wastewater, the proximity of industrial facilities to drinking water sources, and the excessive use of pesticides and chemical fertilizers have contributed to the pollution of groundwater and surface water through runoff from irrigation. This situation has been exacerbated by the continuous rise in water consumption levels, particularly in the agricultural sector, which has severely jeopardized water supplies. This has led to their depletion to the point of exhaustion, their drying up in some areas, and the deterioration of their quality due to pollution. Moreover, the decline in water quality not only imposes an environmental burden but also increases the economic cost of water treatment and ensuring its suitability for use, further straining a sector already suffering from limited financial resources.

Thus, sectoral imbalances are not merely a transient pressure point, but a structural mechanism that perpetuates the water crisis and limits the potential for sustainable treatment unless water resource allocation priorities at the policy level are fundamentally reconsidered. Continuing to prioritize water-intensive agricultural practices under conditions of extreme scarcity imposes high opportunity costs on higher value-added sectors, including industry and urban consumption. Furthermore, this allocation pattern constrains policy flexibility, transforming water distribution into a highly politically sensitive issue that resists reform despite mounting evidence of its structural unsustainability. Herein lies the political cost of sectoral imbalance, as any adjustment to water distribution becomes entangled in complex social and economic balances, sometimes leading the state to postpone reforms instead of making decisive decisions.

Thus, sectoral imbalance acts as a self-reinforcing mechanism, reproducing scarcity rather than correcting it, thus perpetuating the water crisis and preventing the transition to more efficient and equitable water resource management.

4. The Water-Energy-Food Nexus

Jordan's water crisis is intertwined with a close water-energy-food nexus, a link that amplifies systemic risks and deepens vulnerabilities. Every additional cubic meter of water-whether extracted, treated, desalinated, or transported-entails increased energy costs in a country heavily reliant on energy imports. These costs are concentrated primarily in three main stages: deep pumping from aquifers, long-distance water transport to urban consumption centers, and desalination projects, which are among the most energy-intensive options. Consequently, policy

[16] Ministry of Water and Irrigation. (2023). *Summary of the National Water Strategy 2023–2040*. https://www.mwi.gov.jo/ebv4.0/root_storage/ar/eb_list_page/2040_-_2023__ملخص_الإستراتيجية_الوطنية_للمياه.pdf

decisions in the water sector carry financial and strategic implications that extend far beyond the sector itself. [17]

These burdens are clearly quantified, where world Bank estimates indicate that energy used in pumping and treatment accounts for approximately half of the operating costs of Jordan's water sector, and the sector consumes nearly 15% of the country's total electricity production.[18] In simpler terms, securing water in Jordan is inextricably linked to the cost of electricity and fuel, as water production and transportation have become heavily reliant on energy, which makes any water solution directly dependent on the state's financial capacity.

This interdependence transforms water governance into a comprehensive sovereign choice, rather than a limited technical adjustment. Decisions made in the water sector directly impact energy security, food production, financial stability, and levels of external dependence. Recent estimates indicate that the true cost of producing one cubic meter of water is approaching 2 Jordanian dinars, reflecting the increasing financial burden of securing supplies.[19]

The financial burden is evident: energy used in pumping and treatment represents about half of the water sector's operating costs, while the cost of producing one cubic meter is approximately 2 Jordanian dinars, this is in addition to desalination and transportation projects costing billions of dollars, such as the Aqaba-Amman project.

For example, continued depletion of groundwater or expansion of desalination means increased energy consumption and public spending, while reducing agricultural water supplies impacts food security and increases reliance on imports. Desalination and water transport projects also require massive investments, such as the Aqaba-Amman project, estimated to cost around $6 billion, [20]which illustrates that major technological solutions are linked to significant financial and sovereign decisions.

Failure to address these interrelationships within a comprehensive approach risks unleashing cascading pressures across multiple sectors, further entrenching structural vulnerabilities and narrowing the scope for independent policy action. Therefore, addressing the crisis requires

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[17] Ramirez, C., Almulla, Y., Joyce, B., Huber-Lee, A., & Nerini, F. F. (2022). An assessment of strategies for sustainability priority challenges in Jordan using a water–energy–food Nexus approach. *Discover Sustainability*, *3*(1), 23.

[18] World Bank. (2019). *Jordan—JO Energy & Water Sector Reforms development policy loan (DPL)* (Implementation Completion Report Review ICRR0021535). World Bank. https://documents1.worldbank.org/curated/en/532471561641076061/pdf/Jordan-JO-Energy-Water-Sector-Reforms-DPL.pdf

[19] International Growth Centre. (2025). *Jordan water tariff reforms and costs*. https://www.theigc.org/blogs/jordan-water-tariff-reforms-costs

[20] Reuters. (2025, October 29). *Climate fund backs $6 billion Jordan water project with its largest deal*. https://www.reuters.com/sustainability/cop/climate-fund-backs-6-billion-jordan-water-project-with-its-largest-deal-2025-10-29/

integrated policies that balance water demand management, energy efficiency, and food production priorities, rather than addressing each sector in isolation.

5. Political and Institutional Constraints:

Jordan's water crisis is also linked to weak institutions and unclear political decision-making, which diffuses responsibility and undermines planning. The current management system suffers from overlapping tasks, unclear authorities, and a lack of explicit political accountability for outcomes.

Despite the institutional framework that places the Ministry of Water and Irrigation and the Jordan Water Authority in a position of official responsibility for the sector, the distribution of roles between planning, implementation, and oversight does not always operate within clearly defined and practical boundaries. This has impacted inter-institutional coordination, with work often relying on fragmented regulatory approaches rather than a coherent accountability system. In this context, critical decisions are frequently postponed or passed around among relevant authorities without clear institutional resolution or explicit assignment of responsibility for outcomes. For example, well licensing is governed by a clear legal framework, but its application is intertwined with local social, agricultural, and security considerations. When attempting to close unlicensed wells or impose fines, the roles of the water authority, local administration, and sometimes security agencies become overlapping. This overlap renders executive decisions susceptible to hesitation or negotiation, rather than decisive regulatory action.

These institutional problems translate into a weak practical capacity to reduce water loss, slow implementation of demand management reforms, and limited effectiveness in monitoring groundwater use, thus perpetuating the crisis rather than containing it. This also limits the state's ability to make decisive decisions that may be necessary but unpopular. Reforming the water sector requires sovereign decisions with political costs, such as restructuring agricultural subsidies, gradually increasing tariffs, or curbing unauthorized use-steps often postponed to avoid potential social backlash.

In this context, the National Water Strategy 2023–2040 emphasizes that improving institutional management, reducing losses, and enhancing water use efficiency are central elements of any transition toward sustainable water security.[21]

On the other hand, the Water Authority of Jordan (WAJ) is responsible for the operational management of water resources, water supply, and wastewater treatment. While the Ministry of Water and Irrigation (MWI) plays a pivotal role in water management in Jordan, the National Water Strategy aims to build a resilient sector based on a unified approach and to transition toward sustainable water and sanitation management that meets the needs of all residents of

[21] Ministry of Water and Irrigation (MWI). (2023). *National Water Strategy 2023–2040*. Amman, Jordan. https://www.mwi.gov.jo/EBV4.0/Root_Storage/AR/EB_List_Page/national_water_strategy_2023-2040.pdf

Jordan. However, this institutional framework, despite its clarity at the official level, faces practical challenges in implementation and coordination.

In practice, the functional boundaries between these institutions demonstrate considerable flexibility and inconsistency in application. Regulatory bodies and local authorities further complicate the institutional landscape by adding additional layers of decision-making without corresponding mechanisms for coordination or oversight. As a result, no single entity has overall responsibility for the water sector, and no institution bears clear political accountability for the success or failure of the system.

6. Legal and Implementation Gaps

The Jordanian legal framework officially recognizes water resources as public property, affirming the state's sovereign right and responsibility to regulate their use. The Water Authority Law of 1988, amended by Law No. 22 of 2014, forms the legal basis for the ownership and management of water resources in Jordan. According to Article 25 of the law, all water resources (surface and groundwater), territorial waters, rivers, and inland seas are considered state property and may not be used or transferred except in accordance with the provisions of this law.[22]

The law allows for the issuance of licenses to water users and the formation of water user associations where the Ministry of Water and Irrigation, as the entity responsible for managing water resources at the national level, exercises these powers.[23] This system includes issuing fixed-term, renewable permits that specify the quantity of water allowed for use, the conditions of use, and the fees payable by users. The Jordanian Water Authority sets water prices based on the cost of production, treatment, and distribution, and these prices are reviewed periodically to ensure they accurately reflect these costs. A tariff structure that considers the different categories of water users, such as residential, commercial, and industrial, was also adopted.[24]

However, this legal principle faces ongoing implementation challenges. Illegal groundwater extraction, non-compliance with the licensing system, and weak monitoring mechanisms remain widespread, undermining both resource sustainability and institutional credibility.

This discrepancy between legal authority and enforcement capacity reflects not only technical limitations but also deeper political constraints. Enforcement often intersects with entrenched socio-economic and tribal dynamics, making strict application of the law a politically sensitive issue.

[22] Al Naber, M., & Molle, F. (2017). Controlling groundwater over abstraction: state policies vs local practices in the Jordan highlands. *Water policy*, *19*(4), 692-708

[23] Al Naber, M., & Molle, F. (2017). Controlling groundwater over abstraction: state policies vs local practices in the Jordan highlands. *Water policy*, *19*(4), 692-708

[24] Al Naber, M., & Molle, F. (2017). Controlling groundwater over abstraction: state policies vs local practices in the Jordan highlands. *Water policy*, *19*(4), 692-708

Consequently, regulatory agencies often lack the political support necessary to impose sanctions or restrict access, particularly in rural and agricultural contexts. This selective enforcement not only accelerates resource depletion but also sends a signal of institutional weakness, fostering a culture where formal laws are treated as negotiable rather than binding.

7. Fragile Political Sustainability and Postponed Sovereign Commitments

Large-scale water infrastructure projects-such as desalination plants, regional transport systems, or transboundary agreements-spread over decades, not short electoral or ministerial cycles. However, Jordan's water governance framework lacks a binding national mechanism to ensure policy continuity across successive governments. As a result, strategic commitments become vulnerable to fluctuations due to shifting political priorities, financial pressures, and external shocks, leading to delayed implementation, redesign, or partial project implementation.

In Jordan, water scarcity constitutes a structural threat to national security because it intersects with state capacity, the political economy, and long-term systemic risks, rather than being understood as merely a local service delivery failure or a purely environmental challenge. Persistent water shortages constrain economic productivity, undermine food security, and impose increasing financial burdens on the state, weakening its ability to provide essential public services and maintain social stability.

In this context, water insecurity is not merely a technical or regional management issue, but a strategic challenge that shapes a state's resilience, governance credibility, and long-term security outcomes. This makes delaying policy decisions or adopting piecemeal responses increasingly politically and strategically costly. The absence of long-term institutional stabilization transforms water policy into an arena of deferred sovereignty, where critical decisions are acknowledged but their implementation is repeatedly postponed. This is not simply a reflection of a deliberate strategic sequence, but rather a structural risk: the costs of inaction accumulate while political accountability remains fragmented and undefined.

8. Weak Negotiating Capacities in Jordan's Water Sector

Jordan's water crisis is not limited to the scarcity of natural resources; it also encompasses the state's negotiating capacity in managing shared basins and transforming water crises into financial and strategic opportunities. An analysis of Jordan's water management trajectory reveals that the weakness of its negotiating apparatus, which sometimes lacks a connection between technical, legal, and political considerations, is a structural factor exacerbating water vulnerability.

The most prominent dimensions of this challenge include:

The gap between technical considerations and sovereign decision-making:

For many years, water has been treated as a purely technical and administrative matter, managed by engineers and technicians far removed from political decision-makers. This has

limited the ability to impose fair terms in regional negotiations. The absence of proactive water diplomacy, replaced instead by short-term crisis management, constantly places Jordan in a reactive position, further weakening its sovereign stance and making water agreements vulnerable to blackmail or the acceptance of costly conditions.

The Disi Basin: Weak legal and negotiating protection:

The Disi Basin exemplifies the lack of a joint management protocol that obligates parties to carefully considered withdrawal quotas. This leaves the strategic resource vulnerable to depletion without legal safeguards and reflects the absence of a comprehensive negotiating model based on long-term shared interests.

At the local level: Weak social negotiation and internal governance:

The failure to formulate a binding national charter with community groups and agricultural lobbies leads to the continued depletion of groundwater basins at rates that can reach up to 200% of their regenerative capacity. The failure of socio-economic negotiations reflects the state's limited ability to assert its sovereignty over resources and ensure that domestic actors abide by the law.

International platforms: Fragmented discourse and lost funding opportunities:

The performance of Jordanian delegations at international climate conferences demonstrates a lack of unified coordination. This deprives Jordan of billions of dollars in funding opportunities that could have been invested in strategic projects such as desalination and water transport, highlighting the need for a technocratic negotiator who combines legal expertise, water economics, and international politics.

All of these points raise a fundamental question about accountability: Who bears the responsibility if the national water policy fails? Responsibility is distributed among multiple entities, including the Ministry of Water and Irrigation as the policy architect, the Water Authority of Jordan as the implementing body, regulatory bodies tasked with enforcement, successive governments that postpone or modify strategic projects, and legislative authorities that fail to establish long-term, binding frameworks. This fragmentation of responsibility allows for systemic failure without political repercussions, as no single entity can be held fully accountable for the outcomes.[25]

By obscuring political accountability, the current governance arrangements transform water insecurity from a solvable policy challenge into a chronic condition. Therefore, restructuring water governance requires institutional reform, along with a recalibration of political ownership, so that accountability for long-term outcomes is clearly defined and water security becomes a central component of sovereign decision-making

[25] Al Naber, M., & Molle, F. (2017). Controlling groundwater over abstraction: state policies vs local practices in the Jordan highlands. *Water policy*, *19*(4), 692-708.

Policy Risks

Water security in Jordan is a high-risk policy area where the delayed decision-making, fragmented implementation, or strategic hesitation can lead to a cascade of failures across multiple sectors. Unlike traditional infrstructure challenges, water insecurity is exacerbated by conditions of non-recovery, reliance on past practices, and cumulative deterioration. Delayed decisions today limit the range of possible solutions and policies tomorrow, transforming manageable scarcity into a systemic state crisis.

This section examines the key risks associated with delay, piecemeal solutions, geopolitical volatility, and social fragmentation, highlighting how each factor amplifies the others in the absence of decisive and comprehensive state intervention.

1. The Risks of Delay

Delaying the implementation of strategic water supply projects-such as large-scale desalination plants, regional transport infrastructure, or regional water-sharing arrangements-poses a significant long-term risk to Jordan's water security. Continued reliance on depleted aquifers increases the rate of resource depletion beyond natural replenishment capacity, pushing critical reserves toward irreversible depletion. Once depleted, these aquifers cannot be restored within politically or economically meaningful timeframes, tying future generations to a state of perpetual scarcity.

Moreover, delay translates into substantial financial costs. The cost of future water solutions escalates disproportionately over time due to rising energy prices, technological complexity, and environmental degradation. Early strategic intervention allows for phased investment, risk distribution, and the development of effective institutional teams, while delay necessitates large-scale, urgent expenditures under financial pressure and with limited negotiating leverage.

Thus, what may appear to be short-term fiscal prudence transforms into long-term economic vulnerability and constraints on policy flexibility.

2. Risks of Partial Solutions

Partial policy responses-particularly a focus on demand management, conservation campaigns, and public awareness initiatives-represent a second category of systemic risks. While these measures are necessary components of any comprehensive water strategy, they are insufficient to address Jordan's structural water deficit. Conservation alone, without a parallel expansion of sustainable supply, simply redistributes scarcity rather than resolving it, thus perpetuating the system's fragility and limiting its resilience to mounting pressures.

Furthermore, an overemphasis on modifying consumer behavior risks shifting responsibility from the state to individuals, portraying water insecurity as a matter of individual consumption rather than a structural governance issue. This approach not only reduces policy effectiveness but can also undermine public confidence in the state's ability to plan, invest, and secure its long-term

national interests. In the absence of decisive supply-side interventions, partial solutions act as temporary measures that postpone systemic failure rather than prevent it.

3. Geopolitical Risks

Water security transcends mere resource scarcity and extends to imbalances of power among states sharing water basins. These imbalances are shaped by a combination of political, institutional, and technological factors that grant one or more parties greater control over essential water resources.

From the perspective of (water hegemony) , water is not viewed as a neutral resource distributed solely according to legal provisions, but rather as an arena of competition controlled by those with the power to enforce it on the ground. This power manifests in controlling water sources, possessing water transport and transfer networks, wielding regional political influence, or imposing the operational conditions of agreements.

Furthermore, political relations between states play a central role in determining the extent to which water agreements are implemented. It has been noted in many instances that regional responses to political or security changes directly impact the implementation of water agreements, even when clear legal provisions for sharing exist. Consequently, water security becomes part of a larger strategic environment that links water to alliances, sanctions, political pressure, and even economic revenues.

The gap between technical considerations and sovereign decision-making in managing shared basins

The management of water resources in Jordan reflects a recurring pattern of structural weakness in negotiating capabilities, where this weakness is not solely related to limited water resources, but also to the "political-technical" structure of the negotiation process itself, decision-making mechanisms, and the imbalance of power in regional contexts. At the regional level, this manifests itself in Historical water agreements have shown that Jordan entered into crucial negotiations concerning sovereign rights over strategic resources without possessing sufficient political, economic, or geostrategic leverage to impose fair or equitable terms. The shared water file serves as a structural example of this deficiency, as water has been treated for many years as a purely technical and administrative matter managed by technicians and engineers, detached from the strategic political decision-making process, rather than being considered a sovereign issue linked to the very existence of the state's national security. This institutional separation has weakened Jordan's negotiating position at several critical junctures, as the negotiator lacked leverage comparable to that of the other party, which controlled the source or the technology. Scientifically, this gap manifests itself in the absence of proactive water diplomacy based on strategic planning, replaced instead by a crisis management model that consistently places Jordan in a reactive rather than proactive position. This forces Jordan to accept short-term solutions and conditional agreements with high long-term sovereign costs, perpetuating what

can be termed "political water fragility." This fragility ties water security to shifting and potentially exploitable regional understandings, rather than fostering independent and sustainable water sovereignty.

2. The Disi Basin: The Geopolitical Challenge and the Absence of International Protection Protocols

The Disi Basin (Saq-Disi) serves as a stark example of weak regional negotiating power in managing non-renewable (fossil fuel) transboundary water basins. While Jordan relies on this basin as an indispensable strategic source of drinking water, pumping approximately 100 million cubic meters annually, the Jordanian negotiator lacks a legally and internationally binding "joint management agreement" that guarantees equitable quantitative and qualitative water withdrawals. Scientific reality indicates that other parties to the basin are using enormous quantities of water for depleting agricultural purposes through large-scale irrigation systems. Despite this, the Jordanian negotiator has failed to establish the "principle of priority for vital uses" in legal forums, as this principle grants drinking water international legal precedence over agriculture in shared basins. The scientific challenge lies in the absence of a shared hydrological management protocol that obligates parties to adhere to carefully considered withdrawal rates to ensure the basin's sustainability. The lack of technical expertise in shared mathematical modeling has rendered Jordan unable to scientifically challenge observed drops in hydraulic pressure levels, accordingly, this leaves the sole strategic water resource vulnerable to accelerated depletion without legal protection, clearly demonstrating the absence of an integrated negotiation model based on long-term shared interests. Instead, this model has been replaced by accepting a reality imposed technically and on the ground by the other party's intensive withdrawals over decades.

3. The Local Level: Failure of Social Negotiation and Impasse in Internal Governance

The dilemma of weak negotiation at the local level is manifested in the Water Authority's inability to reach a binding "national pact" with community forces and influential agricultural lobbies where this has led to an impasse in enforcing the law and asserting the sovereignty of the resource. The local negotiator finds himself in a position of weakness vis-à-vis those who deplete groundwater without effective technical or legal deterrents. Instead of using rigorous figures that illustrate the economic cost of waste, official discourse often resorts to informal understandings, which, according to World Bank reports, have resulted in the loss of approximately 50% of water due to technical and administrative losses. This deficiency is not merely a lack of personnel, but rather an inability to convince farmers of viable economic alternatives, reflecting a weakness in "socio-economic negotiation." Official data for 2024 indicates that the blatant violations and the drilling of hundreds of illegal wells in the Azraq, Yarmouk, and Disi basins represent a silent negotiating defeat for the state. The lack of efficiency here is embodied in the failure to formulate a social contract that would convince influential stakeholders to shift from water-intensive crops (such as bananas and watermelons) to value-added crops. This has led to the depletion of

aquifers by up to 200% of their regenerative capacity, which scientifically means a death sentence for these aquifers within a few decades due to salinization and accelerated depletion.

4. International Platforms and Fragmented Discourse: Lost Funding Opportunities at Climate Conferences (COP)

The gap in negotiating efficiency is clearly evident in the performance of Jordanian delegations at international conferences of the parties (such as COP28) where Jordan suffers from a fragmented negotiating message and the absence of a unified central body with expertise in climate economics. While neighboring countries successfully develop desalination and treatment projects as part of climate compensation, the Jordanian discourse remains confined to describing the suffering and the Syrian refugee crisis without providing technical feasibility studies that meet the standards of green finance funds. This weakness deprives Jordan of international grants worth billions of dollars that could have covered the costs of the national carrier without burdening the treasury with additional debt. The absence of a technocratic negotiator who combines legal expertise with water economics expertise leads to missed strategic opportunities. As it known the International donors require precise data and clear social and financial return models, which are lacking in Jordan's negotiating files, characterized by generality and emotional appeals. Furthermore, the phenomenon of "institutional amnesia," resulting from the frequent changes in technical teams with each cabinet reshuffle, weakens the international community's confidence in the sustainability of proposed plans. This reinforces Jordan's position as a recipient of emergency aid rather than a strategic partner proactively shaping regional climate policies.

5. The Dimensions of Small State and Financial Dependence in the International System

Jordan's weak negotiating capabilities reflect its status as a "small state" within an international system dominated by more powerful actors where this limits its room for maneuver on sovereign issues such as water and food security. Studies indicate that a lack of "hard power" inevitably leads to an over-reliance on "soft power" and diplomatic initiatives, compelling the Kingdom to engage in negotiations Jordan seeks a "compromise" rather than imposing its own vision. Furthermore, Jordan relies heavily on coordination with international institutions (such as the World Bank) to secure funding, subjecting its national options to imposed negotiating conditions and granting donors leeway to influence national policies and compromise strategic priorities. This financial dependency weakens its capacity for independent negotiation and makes its water sovereignty hostage to external agendas. Also, the absence of a strong and sustained "Arab backing" in international forums further exposes Jordan to political pressure as Assessments of the Arab League's role have revealed weaknesses in building consensus that supports Jordan's water rights, thus widening the gap between the "symbolic capital" of Jordanian diplomacy and tangible "practical gains" in technical, economic, and environmental areas.

Policy Paths

To address the growing concerns surrounding the water crisis, ensuring a continuous and reliable water supply in Jordan is crucial. The current situation necessitates urgent intervention and

investment in wastewater treatment plants, rainwater harvesting, and improved virtual water utilization-all measures that contribute to alleviating pressure on surface and groundwater resources. Reducing water loss and improving distribution efficiency are equally important pathways to increasing supply, especially since losses in Jordan approach 50% according to some estimates.[26] This means that a significant portion of the produced water does not actually reach consumers. The continuation of this level of loss poses a direct threat to the effectiveness of major strategic projects such as the National Water Carrier, as any expansion in supply will remain limited in its impact unless the loss problem is addressed concurrently.

However, addressing water scarcity in Jordan requires a comprehensive package of policy responses rather than relying on a single intervention. This paper assesses three policy options: public awareness and demand management, large-scale desalination, and agricultural wastewater reuse, based on criteria of financial cost, political feasibility, implementation time, social acceptance, and institutional capacity. This assessment does not aim to identify a universally ideal solution, but rather to highlight potential compromises and guide the strategic sequencing of policies.

Option 1: Large-Scale Desalination

Desalination, which has seen significant improvements in recent years and has become more cost-effective, is one of the most direct and reliable means of increasing water supply in Jordan, particularly through regional or large-scale projects. Furthermore, integrating desalination projects with renewable energy can transform this option from a separate water solution into an integrated pathway within the water-energy-food nexus, by reducing reliance on imported energy and lowering long-term operating costs.[27]

The National Water Carrier Project (Aqaba-Amman Desalination) is the most prominent long-term strategic intervention within Jordan's large-scale desalination pathway. The project aims to produce approximately 300 million cubic meters of desalinated drinking water annually, of which about 250 million cubic meters will be transported to Amman to meet growing urban demand and enhance national water security.[28]From this perspective, the project represents a significant addition given the chronic water deficit and reflects a trend toward reducing reliance on transboundary resources and unsustainable groundwater. Moreover, According to the Green

[26] Here's the translation of your text into English:
United States Agency for International Development (USAID). (2022). *Water Governance Activity (WGA)*. Ministry of Water and Irrigation.
https://www.mwi.gov.jo/ebv4.0/root_storage/ar/eb_list_page/usaid_water_governance_activity_(wga)-0.pdf

[27] International Renewable Energy Agency (IRENA) & ETSAP. (2012). *Water Desalination: Technology Brief*. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2012/IRENA-ETSAP-Tech-Brief-I12-Water-Desalination.pdf

[28] Asian Infrastructure Investment Bank (AIIB). (2025). *Jordan: Aqaba–Amman Water Desalination and Conveyance Project*. https://www.aiib.org/en/projects/details/2025/proposed/jordan-aqaba-amman-water-desalination-and-conveyance-project-aawdcp.html

Climate Fund, the project will cover about 45% of municipal water demand by 2040, making it a pivotal element in long-term national water security planning.[29]

However, the project's policy viability is not solely dependent on production volume, but also on its associated costs and operational constraints where the project requires massive investments and relies on a long transmission infrastructure, in addition to high energy demands, Although it includes a 281 MW solar power plant, this energy will only cover about 27% of the project's total requirements, meaning continued reliance on the national grid to supply the majority of its operation[30]. Therefore, while desalination provides a new water source, it also shifts part of the scarcity crisis to the challenge of financial and energy sustainability. Furthermore, the project's effectiveness will remain contingent on parallel reforms within the sector. The continued high losses in water networks, estimated at around 42.3% according to official figures, could limit the impact of any expansion in supply if not addressed concurrently.[31] Therefore, the national water carrier cannot be considered a standalone solution, but rather part of a broader policy package that includes reducing losses, improving governance, and managing demand.

In the long term, the project is being implemented under a long-term operating concession of approximately 30 years;[32] making it, an option that provides a window of water security for decades, but it does not negate the need for integrated responses to address future climate and demographic pressures. Additional risks arise concerning the potential environmental impacts of discharging brine into the Red Sea, necessitating robust environmental protection and regulatory frameworks.

Therefore, while the national desalination project is worthwhile from a strategic water security perspective, it is not a panacea. Its success requires a long-term political commitment and accompanying structural reforms to ensure that the new supply translates into genuine and sustainable water security.

However, this option carries significant financial costs, including high capital investment, long-term operating expenses, and substantial energy requirements. Politically, desalination is a sensitive issue due to its reliance on regional cooperation and external financing, although it remains attractive to policymakers seeking a sustainable supply-side solution. In addition, Implementation timelines are often lengthy, exceeding a decade, due to the planning, financing, and construction phases. Social acceptance is generally high, as desalination does not require

[29] Green Climate Fund. (2025). *Jordan Aqaba–Amman Water Desalination and Conveyance Project (FP288).* https://www.greenclimate.fund/project/fp288
[30] International Finance Corporation (IFC). (2025). *Aqaba-Amman Water Desalination and Conveyance Project: Environmental and Social Review Summary*. https://ewsdata.rightsindevelopment.org/projects/IFC-47924/pdf/
[31] Almamlaka TV. (2026, January 20). Jordan Valley Authority: 42.3% water loss in Jordan. https://www.almamlakatv.com/news/188347
[32] Meridiam. (2024). *Aqaba Water Desalination Project (Jordan): 30-year concession overview*. https://www.meridiam.com/assets/aqaba-water-desalination-jordan/

behavioral changes from consumers, although concerns about environmental impacts and water pricing persist.

Institutionally Jordan's ability to manage these projects depends heavily on international partnerships and external support. Therefore, the viability of desalination can be enhanced through innovative solutions in the energy sector, such as utilizing sludge from wastewater treatment plants and converting it into biogas, rather than viewing it as an environmental burden.[33] This approach can reduce reliance on imported fuels and create a dual investment opportunity that supports both water and energy security.

While desalination is considered the longest-term and most sustainable solution, it does not address the immediate water shortage and poses risks to financial sustainability, justifying its phased or delayed implementation.

The second option: Wastewater reuse in the agricultural sector

Expnding the reuse of treated wastewater in agriculture should be considered urgent, as the agricultural sector consumes approximately 51% of Jordan's total water use[34], despite employing only about 3% of the workforce, [35]and contributing approximately 6.9% to GDP in 2024[36]. Official data indicates that the volume of treated wastewater reused in agricultural projects reached approximately 197.5 million cubic meters in 2024, highlighting the significant untapped potential of this option. [37]

Financially, the costs are moderate, primarily involving the modernization of treatment plants and distribution infrastructure, making this option more cost-effective than desalination. Politically, wastewater reuse is considered viable, especially given existing practices in Jordan, but it requires careful regulation and continuous monitoring to maintain public trust.

This option can be implemented in the medium term, as institutional frameworks are already in place, although expansion remains uneven. Social acceptance is mixed; farmers are often receptive due to water scarcity, while public concerns regarding health and safety persist. Institutionally, the Jordanian water authorities possess relevant expertise, but gaps in oversight and enforcement capacities remain.

[33] World Bank. (2019). *Wastewater: From waste to resource: The case for biogas and energy recovery from sludge*. World Bank.
[34] United Nations Sustainable Development Group. (2022, May 23). Jordanian farmers turn to innovative solutions to tackle the challenge of water scarcity. https://unsdg.un.org/ar/latest/stories/-المزارعون-الأردنيون-يلجؤون-لحلول-مبتكرة-لمواجهة-تحدي-ندرة-المياه
[35] Food and Agriculture Organization. (2024). *Overview of the agricultural sector in Jordan*. FAO
[36] Petra News Agency. (2025, April 7). Agricultural sector contributes 6.9% to Jordan's GDP in 2024.
[37] Petra News Agency. (2025, October 1). *Treated wastewater use reaches 197 million cubic meters in 2024*.

Jordan already provides a practical example of this approach, where Treated wastewater from the Al-Samra wastewater treatment plant is used to support surrounding agricultural areas,[38] and is also transferred to the King Talal Reservoir to provide irrigation water for specific crops in the Jordan Valley.[39] This water is seen as a less expensive alternative to fresh water, reinforcing the viability of reuse as a realistic policy path for agricultural expansion within clear health and regulatory boundaries.

While wastewater reuse cannot completely replace new water sources, it offers significant efficiency gains and is often underutilized due to social and regulatory constraints rather than technical limitations.

The third option: Public awareness and demand management.

Public awareness campaigns and demand management measures aim to reduce per capita water consumption through behavior change, pricing reforms, and improved household water use efficiency. Financially, this option is relatively low-cost compared to infrastructure-intensive solutions, requiring only moderate investments in public communication, education, and regulatory enforcement. Politically, the option is generally considered feasible, although resistance is likely if awareness campaigns are linked to tariff increases or harsher penalties for illegal use.

Implementation can begin in the short term, but measurable impact will be gradual and limited in scope. Social acceptance is mixed; water conservation messages often receive initial support but are inconsistently implemented. Institutionally, Jordan has the administrative capacity to implement such programs, but enforcement and implementation remain uneven. As a standalone solution, demand management is insufficient to address structural water deficits and is therefore viewed as a complementary, integrated response rather than the primary solution for water policy. The following table compares policy options:

Standard	**Wastewater Reuse**	**Widespread desalination**	**Standard**	**Awareness and Demand Management**
Total financial cost	Average	Very high	Total financial cost	low
Implementation timeframe	Average (3–5 years)	Long lifespan (>10 years)	Implementation timeframe	Short (Two years)
Impact on water security	Average	Large	Impact on water security	Limited
Social acceptance	Variable	High	Social acceptance	Variable

[38] World Bank. (2016). *Blended financing for the expansion of the As-Samra wastewater treatment plant*. World Bank Group

[39] Drechsel, P. (2018). Viability gap funding (As Samra, Jordan). CGIAR Research Program on Water, Land and Ecosystems.

Need for governance reform	Average	High	Need for governance reform	Moderate
Energy dependence	Average	High	Energy dependence	Low
Need for external financing	Average	Large	Need for external financing	Small

Policy recommendations

Given the scale and nature of structural water scarcity in Jordan, policy responses should be based on priority, feasibility, and long-term impact, rather than being treated as parallel technical solutions.

First, reducing water loss must be considered an urgent national priority since Losses in water networks approach 50% according to some official estimates, meaning that nearly half of the produced water does not reach consumers. Reducing these losses is a prerequisite for the success of any supply expansion, including major projects like the national carrier, because increased production alone will have a limited impact if network losses continue at this level.[40]

Secondly, large-scale desalination should be prioritized as a long-term strategic option to bolster supplies. Recent estimates indicate that major desalination projects may require substantial investments, such as the Aqaba-Amman project, estimated to cost around $6 billion, demonstrating that desalination is a long-term sovereign choice rather than a quick fix.[41] The national carrier is the most prominent path to long-term desalination, but it will not succeed without reducing losses and reforming governance, despite improvements in desalination efficiency globally. However, its application in Jordan is associated with additional costs due to Amman's high elevation and distance from the coast, making pumping and transportation costs a crucial factor in its financial viability.

Over the years, several large-scale projects have been proposed, such as long-distance water transfers from the Mediterranean or the Dead Sea. The Red Sea-Dead Sea Water Conveyance Project has been the subject of careful environmental study due to its potential risks to sensitive ecosystems. Importing water from Turkey via pipelines or ships is another option. However, these options are not feasible in the short term because they require massive capital investments, long implementation periods, and regional political complexities that could hinder the process. The primary responsibility lies with the national government, in coordination with regional partners and international supporters, to secure financing, manage geopolitical risks, and integrate desalination into the national water plan. Although implementation will take time, immediate

[40] Ministry of Water and Irrigation (MWI). (2023). National Water Strategy 2023–2040. Amman, Jordan
[41] Reuters. (2025, October 29). *Climate fund backs $6 billion Jordan water project with its largest deal*.

action is essential to solidify political commitments and financial frameworks, as further delays will significantly exacerbate future water insecurity.

Third, wastewater reuse in the agricultural sector is a second priority with medium-term returns. Water authorities and ministries of agriculture must expand treatment capacity, strengthen regulatory oversight, and encourage the adoption of these practices among farmers within a defined implementation window of three to five years. Official data indicates that the volume of treated wastewater reused in agriculture reached approximately 197.5 million cubic meters in 2024, reflecting the significant potential of this option if scaled up systematically.[42] This option is relatively viable and cost-effective, but it requires ongoing institutional coordination and public trust to mitigate health and compliance risks.

Finally, public awareness campaigns and demand management should be pursued as a short-term complementary measure, not a primary solution. Government agencies and municipalities should focus on targeted conservation messages, enforce penalties for illegal use, and selectively adjust tariffs. While these measures can be implemented quickly, their impact is inherently limited and dependent on broader structural reforms. Treating awareness campaigns as a substitute for supply-side investment is risky, as it may overlook the severity of Jordan's water deficit instead of addressing it.

Conclusion

This policy paper has made it clear that Jordan's water crisis cannot be adequately understood as merely a physical scarcity problem or a purely technical challenge awaiting efficiency improvements or management reforms. The central danger lies in the continued postponement of sovereign decision-making in a policy area where such procrastination becomes a risk multiplier. Every year of inaction not only accelerates the depletion of groundwater reserves beyond sustainable limits but also increases the cost of future interventions, narrows the range of possible policy options, and deepens Jordan's structural dependence on external actors, technologies, and political arrangements. From this perspective, water insecurity is not simply an environmental condition but a cumulative political consequence of delayed decisions and diffused responsibility.

The analysis has shown that water insecurity in Jordan is structurally reproduced through the interaction of factors such as persistent scarcity, external dependence, sectoral imbalances, and the water-energy-food nexus, transforming water policy into a matter of national stability and strategic autonomy. Partial measures such as demand management, public awareness campaigns, and expanding wastewater reuse play a necessary but fundamentally insufficient role. These measures may alleviate pressures in the short and medium term, but they do not close the widening structural gap in water supply.

[42] Petra News Agency. (2025). *Treated wastewater use reaches 197 million cubic meters in 2024*

The lack of decisive progress in large-scale water supply enhancement, particularly desalination, is not merely a cautious prioritization; it is a postponement of responsibility with long-term consequences. What is at stake is not just the sustainability of water resources, but the state's ability to formulate, commit to, and maintain long-term strategic decisions across political cycles. Water security has become a measure of institutional cohesion, policy continuity, and sovereign resolve. As delays accumulate, political space shrinks: future governments will face fewer options, higher costs, and greater vulnerability to social and political risks. What may seem cautious today will become increasingly fragile in the future.

The key policy conclusion of this paper is clear: failure to act on water security is not a neutral or passive outcome, but an active policy choice that shifts escalating economic, social, and environmental burdens to future generations. Therefore, early and decisive commitment is not merely desirable, but essential and imperative. Reframing water security as a fundamental pillar of national resilience, rather than viewing it as a sectoral service issue, is essential if Jordan wants to maintain its stability, independence, and ability to achieve sustainable development in an increasingly restrictive regional and climatic environment.