Policy Brief

June 2026

Policy Area	**Water Governance, Distribution and Climate Resilience**
Recipient	Council of Common Interests (CCI), Ministry of Water Resources, Provincial Governments, and International Development Partners (SDG 6.2 Focus)
Crux	Inefficiencies in **transboundary water management (Indus Waters Treaty/IWT)** directly exacerbate **inter-provincial water conflicts (Water Apportionment Accord/WAA)**, leading to chronic water scarcity, flood vulnerability, and threatening Pakistan's food security and national stability.

The Dual Crisis: Transboundary Conflict and Intra-Provincial Water Insecurity in Pakistan.

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ABSTRACT

Pakistan is currently grappling with a critical dual water crisis: chronic, intensifying scarcity and extreme vulnerability to catastrophic flooding. Ranked 14th globally for water stress, the nation is projected to transition from its 2027 "water -stressed "baseline to "absolute scarcity" by 2050 as per capita availability falls below 500m^3. The crises is driven by a "perfect storm" of rapid population growth-expected to reach 366 million by 2050 and climate induced disruption such as retreat and erratic monsoons.

The core challenge lies in a cascading governance failure where transboundary tensions regarding Indus Water Treaty (IWT) exacerbate internal mistrust over the 1991 Water Apportionment Accord (WAA), this policy brief identifies significant inefficiencies, including a dismal 39% irrigation efficiency rate, outdated colonial-era infrastructure, and a lack of integrated groundwater management. These systematic issues are further complicated by the administrative shifts of the 18th constitutional amendment, which requires a bottom-up approach to water policy that currently lacks robust -provincial cooperation.

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1. Introduction

Pakistan, the world's fifth most populus country, is facing an accelerating water crisis that threatens its economic growth, food security, and social stability. Despite its size and importance in the region, Pakistan ranks only 36th globally in renewable water resources far behind India (8th) and Bangladesh (12th).

Water withdrawal from the Indus River Basin (IRB) have surged from 153.6 billion cubic meters (BCM) in 1972 to 200 BCM in 2020, reflecting an unsustainable annual growth rate of 0.7% and pushing country into the category of extremely high water stress.

This crisis is driven by multiple, interconnected factors: rapid population growth, expanding urbanization, inefficient irrigation and water management practices, and the intensifying impacts of climate change including glacial retreat, erratic rainfall, and recurrent drought and floods. If left unaddressed, these pressures will widen the gap between water demand and supply, creating severe challenges for agriculture, energy, public health, and overall socio-economic development by 2030-2050.

Against this backdrop, this policy brief aims to:

1. Highlight the severity of emerging water crises in Pakistan in the coming decades (2030–2050).

2. Identify key policy-level challenges at both interprovincial and national levels.

3. Recommend actionable policy solutions to mitigate risks and promote sustainable water management.

Currently, understanding the magnitude of Pakistan's water crisis requires a closer examination of the structural and policy-level factors that exacerbate water scarcity. These include interprovincial disparities in water allocation, outdated irrigation infrastructure, limited adoption of water-efficient technologies, and gaps in governance and coordination among relevant agencies. In addition, population growth, urban expansion, and climate change intensify competition for scarce resources, making effective policy interventions both urgent and complex. By analyzing these challenges in detail, this policy brief provides a foundation for identifying practical, evidence-based solutions that can ensure equitable and sustainable water management across the country. The following sections explore these issues and outline actionable recommendations for policymakers.

2. Hydro-Demographic Transition: From Water Stress to Extreme Scarcity (1955–2050)

Pakistan's water resources have undergone a dramatic transformation over the past seven decades shifting from relative abundance to extreme scarcity.

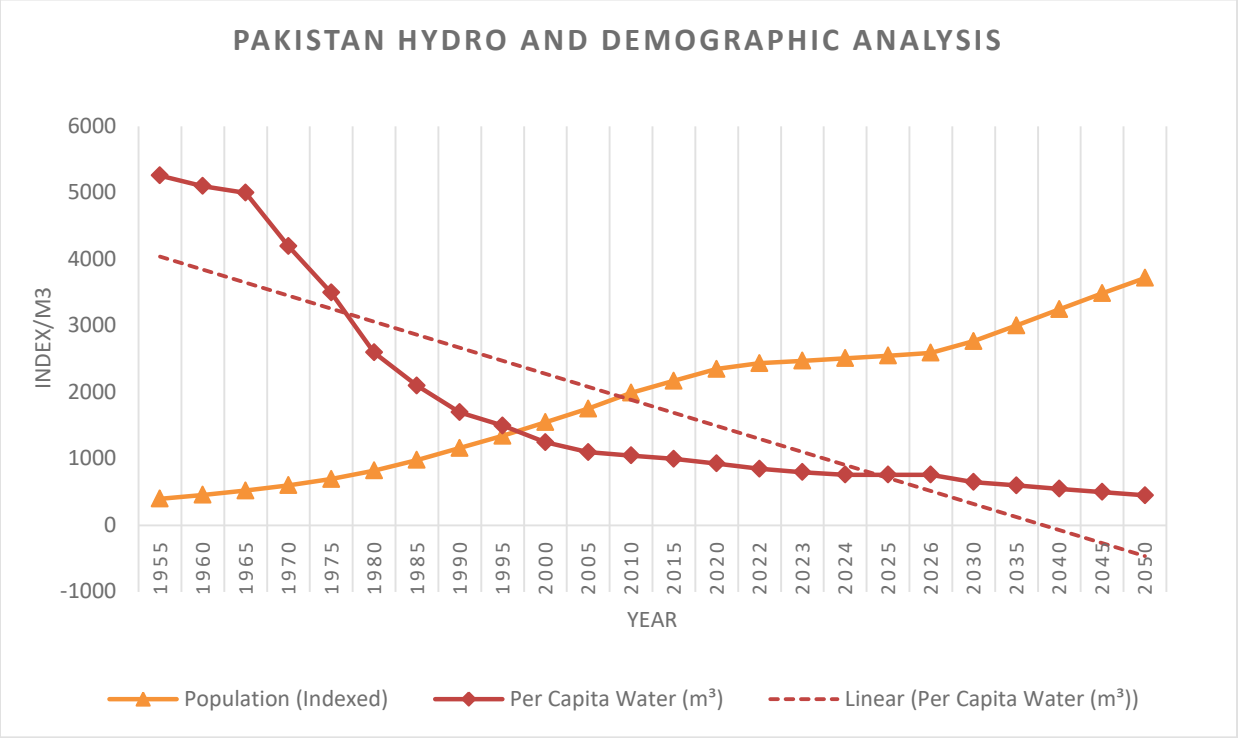
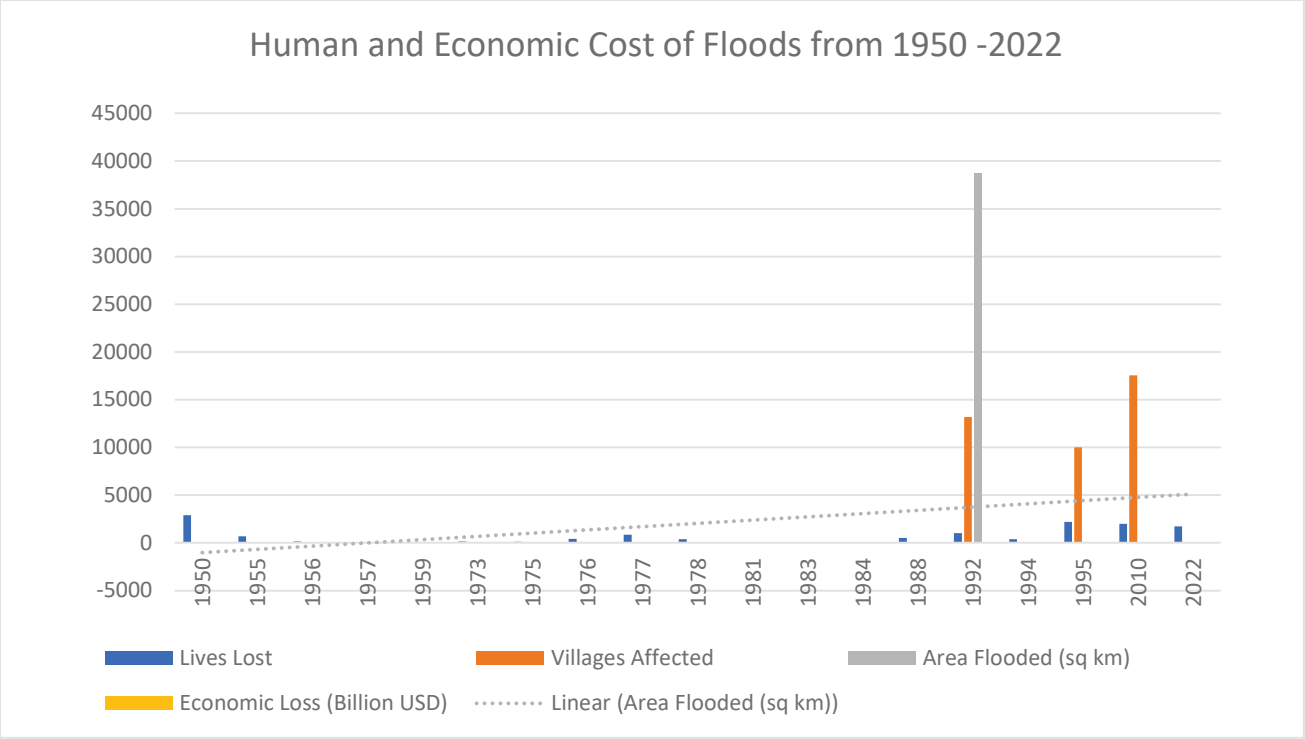


Figure 1: Pakistan's transition from water abundance to extreme water scarcity (1955–2050), showing declining per capita water availability against rising population pressure. Scarcity thresholds are based on the Falken mark Water Stress Index. Historical values are derived from FAO AQUASTAT and PCRWR, while projections are informed by UN population forecasts and World Bank water availability trends.

Hydro -population analysis (Figure 1) is showing that per capita water availability decreased substantially over the years since 1950. Primarily it was 5600 m^3 per capita in 1950-1955, however, as per recent statistics it is 760m^3. Notwithstanding, the water scarcity crisis is compounded by climate change, which increases the frequency of climate-induced disasters—like the devastating floods of 2022 and 2025 in overall Pakistan while simultaneously threatening future flows. This hydro-demographic transition underscores the critical need for forward-looking policies and intervention to secure sustainable water availability in Pakistan through 2050.



Sources: Manzoor et al., 2013 and the Flood Federal Commission report.

FIGURE 2

Economic cost of floods in Pakistan

The Figure 2 presents an acute risk to climatically vulnerable provinces. Notably, the Sindh and Balochistan are most vulnerable provinces in the country in term of surface water availability. Because, according to the WEAP-based regression analysis by Yaqoob and Mujahid (2025), the rainfall–runoff–irrigation demand method indicated that by 2040**, less than 30% of the area under crop cultivation will have access to surface water for the irrigation of major cash crops in Sindh**. Furthermore, Balochistan is also expected to face severe impacts due to its limited share of water from the Indus River Basin system, deepened by constrained financial resources and institutional capacity to develop and implement an Integrated Water Resources Management (IWRM) framework.

2.1. The Dual Framework Failure: IWT - WAA

The management of Pakistan's water resources is necessarily centered on the Indus River Basin, governed by two foundational but increasingly inadequate legal documents:

2.1.1. Transboundary Governance: Indus Waters Treaty (1960)

Academic critiques highlight its limitations in addressing modern pressures like climate change, new hydropower construction, and the lack of robust provisions for lower riparian rights, translating upstream uncertainty into a domestic resource threat.

Sources: Author generated.

2.1.2. Intra-Provincial Governance: Water Apportionment Accord (1991):

The Water Apportionment Accord (WAA) of 1991 for domestic allocation. The fragility of this domestic document is exposed when transboundary pressures reduce the overall available resource, fueling deep inter-provincial disputes over unequal distribution and legal enforcement.

The WAA provides the current formula for intra-provincial water shares (based on pre-1977-78 average uses), which is primarily surface-water based and does not account for modern pressures like population growth or climate change.

TABLE 1.1

Provincial water shares as per Water Apportionment Accord (1991)

Province	Kharif	Rabi	Total
Punjab	37.07	18.87	55.94
Sindh	33.94	14.82	48.76
A. Khyber Pakhtunkhwa	3.48	2.3	5.78
B. Civil Canals**	1.8	1.2	3.0
Balochistan	2.85	1.02	3.87
Total	79.14	38.24	117.35

Sources: Water Apportionment Accord (1991) http://pakirsa.gov.pk/WAA.aspx.
* Including already sanctioned Urban and Industrial uses for Metropolitan Karachi.
** Ungauged Civil Canals above the rim stations.

The Accord faces continuous challenges, with provinces prioritizing local needs over downstream riparian impacts. The upstream-downstream dynamic, especially between Punjab and Sindh, is a persistent source of friction, with the Indus River System Authority (IRSA) often failing to regulate and monitor distribution effectively amidst political pressure.

3. The Domestic Governance and Efficiency Deficit

The internal crisis is characterized by cooperative federalism challenges that have strained the provincial autonomy. Since the **18th Constitutional Amendment (2010)** devolved extensive powers to the provinces, national water policy is now required to be built from the bottom up. While this shift is progressive, it demands robust inter-provincial cooperation, which is currently lacking, making national policy coherence difficult[3].

[3] The **Council of Common Interests (CCI)** is the constitutional body responsible for resolving disputes, but its decisions are frequently challenged.

Moreover, significant transmission losses occur because the water delivery infrastructure and its management framework are largely remnants of the colonial era. These losses are compounded by a high sedimentation rate in reservoirs, which reduces essential storage capacity—currently sufficient for only approximately 30 days of river flow. As a result, the country's overall irrigation efficiency is a dismal **39%**, representing a catastrophic loss of available water. This low efficiency, particularly in the agricultural sector—the largest water user—directly accelerates water scarcity and reduces crop yields, worsening food insecurity.

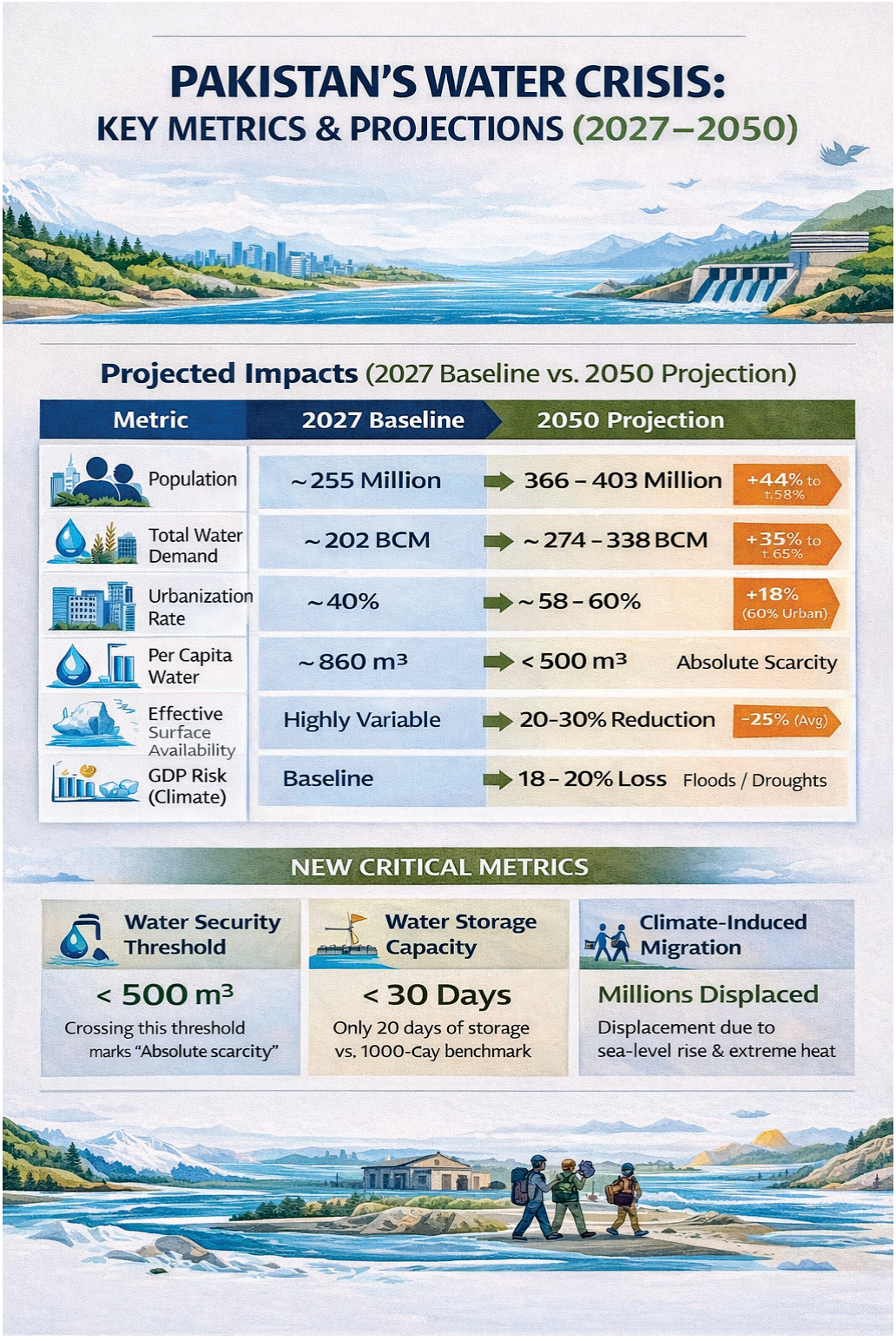
The uncontrolled abstraction of groundwater adds another layer of inefficiency. The failure to integrate **surface water and groundwater management (conjunctive use)** has led to rampant, unregulated over-extraction, particularly on the **Balochistan Plateau**, causing rapid aquifer depletion.

4. Water Trajectories and Climate Threat

Since 2010 there has been little increase in minimum and maximum temperatures observed. Particularly, unprecedented *kharif* (monsoon) rainfall is disrupting crop patterns in Punjab, along with frequent flooding. Despite centralized management and extensive investment in flood control since 1947. There has been no significant reduction in the flood-to-damage ratio, highlighting the failure to optimize structural and non-structural flood control measures. These climatic variations necessitate improving water productivity to improve the crop productivity. For instance, wheat is the most water-productive crop, while rice is the least, which shows the highest potential for efficiency gains. Subsequently, this climate change phenomenon is shifting market dynamics, causing farmers to switch from the relatively water-efficient cotton to water-intensive crops like sugarcane, counteracting any efficiency gains and placing greater strain on the already stressed system.

The data in above provided table paints a picture of a "perfect storm" for Pakistan's future stability. By 2050, the country faces a fundamental mismatch between its rapidly growing human footprint and its shrinking natural resources. This transition from the 2027 baseline to the 2050 projection indicates a shift from being "water-stressed" to facing "absolute water scarcity."

The population is expected to surge from approximately 255 million in 2027 to 366 million by 2050—a 44% increase. This adds roughly 111 million people to the national registry, effectively adding another "Germany" to the country's resource requirements. Parallel to this is the rapid urbanization rate, projected to climb from 40% to 58%. This concentration of people into urban centers will double the demand for municipal water services, straining aging infrastructure that already loses nearly 35–40% of its water to leakages and theft.



Sources: UNFPA (2024/25), Pakistan Population Census (2023), IISD Hydrological Models, World Bank climate risk assessments.

5. The Water Deficit: Rising Demand vs. Falling Supply

While the Total Water Demand is projected to rise to an average of 274 BCM (a 35% increase), the Surface Water Flow—the lifeblood of the Indus Basin—is anticipated to drop by an average of 20-30%. This reduction is primarily driven by climate change, specifically the melting of Himalayan glaciers and increasingly erratic monsoon patterns. Consequently, Pakistan's per capita water availability, which has already plummeted from over 5,000 m^3 in 1951 to around 1,000 m^3 today, is expected to fall well below the critical scarcity threshold of 500 m^3 by 2050.

6. Policy Recommendations: Toward an Integrated and Equitable Water Framework

As per findings of this policy brief following recommendations are proposed:

I. Establish an enforceable national water policy by using the 18th Amendment framework to create a binding policy that synthesizes provincial strategies and mandates real-time data sharing through a strengthened IRSA.

II. Modernize water laws and integrate groundwater management by revising the colonial-era Canal and Drainage Act (1873) to incorporate groundwater regulation and establish clear, legally enforceable rules for conjunctive use and abstraction permits across all provinces.

III. Strengthen the Council of Common Interests (CCI) as the final, depoliticized authority for WAA disputes, ensuring decisions are based on transparent, independently verified hydrological data.

IV. Launch a federally mandated program to shift agriculture away from flood irrigation in water-intensive crop areas (rice, sugarcane) and provide targeted subsidies and technical assistance for micro-irrigation systems (drip/sprinkler), aiming to raise national irrigation efficiency from 39% to at least 50% by 2030.

V. Introduce a graduated water tariff for agriculture and industry to incentivize conservation and penalize inefficient use while protecting essential household and drinking water supplies.

VI. Encourage farmers, particularly in climatically stressed regions, to prioritize more water-productive crops such as wheat and oilseeds over water-intensive cash crops using agricultural extension services and market incentives.

VII. Invest in rehabilitating and modernizing existing canal systems to reduce conveyance losses, while also developing small-to-medium reservoirs and decentralized rainwater harvesting structures in vulnerable provinces (Sindh, Balochistan) to enhance local resilience and storage capacity.

VIII. Develop a National Flood Risk Optimization Policy that integrates non-structural measures (improved forecasting, early warning systems, floodplain zoning) with structural controls to reduce the flood-to-damage ratio.

IX. Fund and implement an integrated methodology combining Natural Resource Production Theory, the DPSIR framework, and the WEAP rainfall-runoff model to scientifically quantify available

water and analyze allocation from Panjnad (upstream) to Kotri (downstream), forming the basis for a sustainable and equitable water allocation framework for 2025–2050.

X. Recognize that historical floods, such as the $40 billion losses in 2022, will be compounded by future climate and socio-economic pressures; with 25% less baseline surface water, flash droughts will harden soils, reducing absorption, and sudden intense rains will trigger

XI. catastrophic runoff and floods, threatening larger urban populations and an agricultural sector that still accounts for over 90% of freshwater use.

7. Conclusion

The crises in the Indus River basin illustrate that water scarcity and flood vulnerability are two sides of the same governance challenge. While Indus water treaty (IWT) sets the international boundary conditions, Pakistan's ability to achieve cooperative federalism under the Water Apportionment Accord (WAA). Immediate and decisive investment in governance reform, water -use -efficiency, and data -driven allocation is therefore not merely an environmental necessity but a national security and economic imperative, critical for ensuring food security, energy stability, and overall socio-economic resilience for a rapidly growing population. The convergence of water scarcity, population growth, and climatic variability creates a perfect storm for Pakistan's future stability. Historical events, such as the $40 billion loses in the 2022 floods highlights the scale of potential damage. With declining surface water, increasing urbanization, and the intensification of flash droughts, floods and future water crises will threaten both human population and agriculture sector that still consumes over 90% of freshwater resources. Immediate integrated action is essential to secure Pakistan's water future, protect livelihood, and safe guarding the country's economics and human security.

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