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OVERVIEW

The Economics of Water Scarcity in the Middle East and North Africa

INSTITUTIONAL SOLUTIONS

Dominick de Waal
Stuti Khemani
Andrea Barone
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WORLD BANK GROUP

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This booklet contains the overview from *The Economics of Water Scarcity in the Middle East and North Africa: Institutional Solutions*, doi: 10.1596/978-1-4648-1739-7. A PDF of the final book is available at https://openknowledge.worldbank.org/ and http://documents.worldbank.org/, and print copies can be ordered at www.amazon.com. Please use the final version of the book for citation, reproduction, and adaptation purposes.

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Cover and interior design: Melina Rose Yingling/World Bank

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Foreword

The long-standing challenge of water in the Middle East and North Africa (MENA) has become even more urgent as the wide-ranging impacts of climate change unfold. With current water management strategies across MENA, a conservative estimate of water demand in 2050 points to the need for an additional 25 billion cubic meters a year. Satisfying this demand would equate to building another 65 desalination plants the size of the Ras Al Khair plant in Saudi Arabia—currently the largest in the world.

To meet that twenty-first century challenge, this bold report goes where we have rarely gone before by explicitly acknowledging the politics that make it difficult for leaders to pursue policies to sustainably manage scarce water resources. What's clear from this report is that the region can no longer rely on a strategy of investing in water infrastructure to increase its supply for agriculture and cities, without also making systematic institutional reforms to finance and maintain that infrastructure and regulate the demand side. Across all MENA countries only two water utilities were able to cover their expenditure on operation and maintenance, let alone their capital costs.

The Economics of Water Scarcity in MENA: Institutional Solutions identifies promising institutional reforms to tackle the political challenges of pricing water, improving the performance of water utilities, and allocating water between agriculture and cities. These reforms involve delegation of greater autonomy and policy powers to manage different aspects of water services and allocation: to professional utilities and national-level technical agencies on the one hand and to local governments on the other hand. Together, these reforms are envisioned to *build legitimacy* for pricing and regulating water, so that citizens start owning these policies, thus making them sustainable and durable. The reforms hold potential to *build trust* in government agencies to deliver reliable water services, reduce waste and leakages, and generate sufficient revenues to attract long-term financing for long-lived water infrastructure.

Managing the existential issue of water in MENA is not only about the political will of a few leaders at the top of the hierarchy. It is also about changing the beliefs and expectations of people down the chain of authority in myriad government agencies that manage water services and allocation, all the way to the citizens living in rural and urban communities. To change these beliefs and expectations, we need to understand them, and design institutional reforms accordingly. Thus, outreach campaigns, transparent decision-making, and civic education become a significant part of the reforms program.

For example, outreach with citizens will uncover which types of water tariff structures may resonate with ideas of fairness, such as by ensuring affordability of a minimum basic amount needed for life. Data on incentives and norms among utility managers and staff will help utilities design contracts that improve performance by building trust that each person is working to improve utility performance. Strengthening the capacity of local government leaders will help them work with and support citizens through the difficult challenges of managing water allocation between agriculture and cities.

Using rigorous data-driven evidence, different countries can tailor institutional reforms to their own socio-political contexts. These reforms would seek to empower utility staff and local government leaders to manage different aspects of water by building trust with the citizens they serve. Institutional reforms in the critical sector of water can be potentially transformative, not only by shifting how the state functions in devising and implementing water policies but also, more broadly, by changing the social contract in MENA.

Ferid Belhaj
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Acknowledgments

The authors are grateful to contributions from Rajesh Advani, Elvira Broeks Motta, Luke Gates, Mohamad Mahgoub Hamid, Amal Talbi, Mili Varughese, and Sally Zgheib (World Bank), as well as background inputs from Sophie Erfurth, Dustin Garrick, Hussam Hussein, and Isabel Jorgensen (University of Oxford), and Adrian Cabas and Ricardo Garcia Leandro (International Technical Assistance Consultants).

We would also like to thank the peer reviewers at the concept stage, Richard Damania, Quy-Toan Do, and Irina Klytchnikova (World Bank) and the peer reviewers at the decision stage, Quy-Toan Do, Irina Klytchnikova, Fan Zhang (World Bank), and Shanta Devarajan (Georgetown University).

Additional advice and guidance were provided by Richard Abdulnour, Amat Ali, Mohamed Al-Soswa, Oliver Braedt, Eileen Burke, Nabil Chaherli, Roberta Gatti, Nancy Gracia, Michael Haney, Daniel Lederman, Lamia Mansour, Carmen Nonay, Gustavo Saltiel, Jenifer Sara, Ayat Soliman, Pieter Waalewijn, and Sally Zgheib (World Bank), Hassan Benabderrazik (Economist, Former General Secretary of the Moroccan Ministry of Agriculture and the Ministry of Economic Affairs), Namrata Kala (MIT Sloan School of Management), Hamid Mohtadi (University of Wisconsin/Minnesota), Will Rafey (UCLA), and Rajiv Sethi (Barnard College and Columbia University).

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21st century, to address problems such as climate change, water scarcity, public health, conflict, and (lack of) fairness in economic systems, which fuels social unrest. She applies economic theory to develop innovative policy ideas for how to strengthen state capacity to address these problems and build trust and legitimacy in society. Her research and advisory work span a diverse range of countries, including Benin, China, India, Nigeria, the Philippines, Tanzania, and Uganda. She holds a BA in economics and mathematics from Mount Holyoke College and a PhD in economics from the Massachusetts Institute of Technology.

Main Messages

- **The Middle East and North Africa (MENA) region faces *unprecedented water scarcity,* both for life and to sustain livelihoods. *Farmers and cities* are competing for water, which is stretching water systems to the brink of collapse.**
  - By 2030, the water available per capita annually in MENA *will fall below the absolute water scarcity threshold* of 500 cubic meters per person per year.[1]
  - Water scarcity will become even more acute as the population grows. The region's population grew from just over 100 million people in 1960 to more than 450 million in 2018. It is estimated to reach more than 720 million by 2050.
  - With current water management strategies, a conservative estimate of water demand in 2050 is that an additional 25 billion cubic meters a year will be needed, equivalent to building 65 desalination plants the size of the Ras Al Khair plant in Saudi Arabia—currently the largest in the world.
  - Without action, water shortages will have *a detrimental impact on livelihoods and agricultural output* and may *raise tensions among users*.
- **MENA has tackled water scarcity by exploiting multiple ways to increase water supply (building more dams, tapping into groundwater, and increasing desalination) without adequately addressing critical efficiency and governance issues. This is *fiscally and environmentally unsustainable*.**
  - There has been *little focus on reducing water losses* and introducing efficiency measures that would conserve water. For example, half of the utility service providers reported that more than 30 percent of the water they produce is not billed to customers due to a combination of leaky pipes, inaccurate water meters, and illegal connections.
  - Unsustainable withdrawal of groundwater has enabled policy makers to *delay tackling water management and services reforms*. Unsustainable withdrawals of water and increasing brine discharges from desalination are degrading marine ecosystems.
  - MENA has relied increasingly on *imports of virtual water*—water used to produce commodities such as cereals—which doubled between 1998 and 2010. Reliance on virtual water imports exposes countries to supply shocks, such as the recent war in Ukraine.
  - Existing *institutions* that manage the allocation of water across competing needs—particularly between agriculture and cities—are *highly centralized and technocratic*—which limits their ability to resolve trade-offs in water use at the local level.
  - Reforms are needed to *increase autonomy and decentralize decisions* about water management and service delivery.
- **The report identifies a series of *institutional policy reforms* for national water agencies and utilities and proposes *delegating decision making over water allocations* to locally representative governments, which would help the region tackle and overcome water distress.**
  - The report addresses two crucial challenges: *lack of legitimacy* and *trust*. Evidence from the World Values Survey shows that people in the region believe that a key role of government is to keep prices down and that governments are reluctant to raise tariffs due to the risk of widespread protests.

- *Devolving greater powers over water allocation decisions* to locally representative governments, within a national water strategy, could *lend legitimacy* to difficult trade-offs in the use of water, compared to top-down directives from central ministries.
- Giving greater autonomy to utilities to reach out to customers on tariff changes could also win greater compliance with tariff structures, *lowering the risk of protests and public unrest*.
- Management reforms in utilities could help to *build trust* in government agencies to manage long-term financing for water infrastructure, by delivering reliable services, reducing waste and leakages, and generating revenues to service long-term debt.
- For institutional reforms to succeed, there must be *better communications* around water scarcity and national water strategies. In countries such as Brazil and South Africa, strategic communication efforts complemented reforms to reduce water use. For example, in Cape Town, the city shared a "water dashboard," which gave weekly updates on total water usage in the city as it approached "Day Zero" (when water was set to run out). Such transparency by a locally elected representative city government persuaded residents of the urgency and made them more likely to comply with restrictions.
- In sum, these *institutional reforms* could help governments to *renegotiate the social contract* with the people of MENA. Instead of "top-down" directives to price and regulate water use, greater delegation to technical water resource management agencies, utilities, and local governments could build the legitimacy of and trust in the state to manage water scarcity.

NOTE

1. As defined by Falkenmark, Lundqvist, and Widstrand (1989).

REFERENCE

Falkenmark, M., J. Lundqvist, and C. Widstrand. 1989. "Macro-Scale Water Scarcity Requires Micro-Scale Approaches." *Natural Resources Forum* 13: 258–67. https://doi.org/10.1111/j.1477-8947.1989.tb00348.x.

Executive Summary

The Middle East and North Africa (MENA) region is facing an acute lack of water for life and livelihoods. Despite significant infrastructure investments over the past decades, countries in the region are grappling with unprecedented, ever-worsening water scarcity due to population growth, climate change, and socioeconomic development. The region has seen its population grow from just over 100 million people in 1960 to more than 450 million in 2018, with the medium forecasts of population in 2050 estimated at more than 720 million. By 2030, average annual per capita water resource availability across MENA will fall below the absolute water scarcity threshold of 500 cubic meters per person per year.[1] Underlying this average, the MENA region is made up of a highly diverse range of countries in terms of both economic and hydrological contexts. Economic circumstances have shaped water use, and water availability has shaped economies.

The old water scarce countries—those below the absolute water scarcity threshold—are the more urbanized countries in the region, with lower per capita water withdrawals as they are less reliant on water intensive rural livelihoods. However, as a result, most are heavily reliant on cereal imports for over 80 percent of their needs. The *high-income countries* in this group have spent heavily on nonconventional water (desalination and wastewater reuse), with the aim of "decoupling" their water needs from the ecological limits of renewable water resource endowments. The *middle-income countries* in this group have started to invest in nonconventional water and are beginning to see the fiscal implications of desalinating water, transferring it to demand centers, and then treating wastewater for agricultural use. The *fragile countries* in this group rely heavily on aid for supply-side infrastructure and for operation and maintenance of water and sewer systems.

The new water scarce countries in the region—those above the absolute water scarcity threshold of 500 cubic meters per person per year—are middle-income countries. Five countries in this group—Iraq, the Syrian Arab Republic, the Arab Republic of Egypt, the Islamic Republic of Iran, and Morocco—have sizable agrarian populations and are home to over 70 percent of the region's rural population. They grow over half the amount of cereal they need and are self-sufficient in fruits and vegetables. However, their populations are growing rapidly, and increasing the supply of nonconventional water is an emerging area of policy debate and investment.

A common long-term trend across the diversity of countries in the region is that greater emphasis has been put on increasing the supply of water rather than managing demand. This established the widespread belief in societies across the region that the problem of water scarcity is driven by supply-side constraints. Increasing the supply of water, without equal emphasis on demand-side measures, has led both water utilities and irrigated agriculture across MENA to undervalue water and thus underinvest in reducing water losses and other efficiency measures. Half of the utility service providers for which data were collected reported that more than 30 percent of the water they produce is not billed to customers due to a combination of physical and other losses.[2]

Countries have also relied on rising levels of virtual water imports, including imports of cereals, and are resorting to unsustainable water withdrawals. Virtual water imports across MENA—the water embodied in the production of agricultural commodities—doubled between 1998 and 2010. Relying on these rising levels of virtual water imports along with unsustainable withdrawals of groundwater has enabled policy makers in the region to delay tackling water management and water services reforms.

Whole communities of farmers are seeing water sources, on which they have relied for their livelihoods for generations, rapidly deteriorating or disappearing. From time to time, urban residents have turned to the streets to demand basic services, while water utilities are unable to cover the costs of operations and raise the financing needed to improve water and sanitation services.

Policy regimes for managing water allocation across competing needs are entirely determined by state ownership of large water infrastructure. Despite the water scarcity faced in the region, water markets have not emerged.[3] Agriculture, industry (oil in particular), and water supply and sanitation (WSS) compete for access to water controlled by the state in the absence of market mechanisms. The current policy regimes for managing the allocation of water both within agriculture as well as across sectors are unsustainable because the availability of water as a resource is being outstripped by its consumption.

This report confronts the persistence and severity of the problem of water in MENA and calls for new thinking and insights into resolving the institutional challenges faced by applying the tools of public economics—going beyond the standard economic tools of market-based competition. The state, and its institutions of government, has a key role to play in the allocation of water across agriculture and cities, regulation of utilities, and management of water as a scarce resource. The report provides policy ideas for how to organize and manage a variety of government agencies that are tasked with playing these inescapable roles of the state in managing and allocating water. These policy ideas address two crucial challenges facing states in MENA: lack of *legitimacy* and *trust*. The report shows how the economics of government (the public sector) can be used to clarify what legitimacy and trust are in the context of the problem of water in MENA, and how policies can be designed to bolster legitimacy and build trust not only to tackle immediate issues in the water sector, but also for broader economic transformation.[4]

Legitimacy, as used in economic theory and in this report, is the ability of the state, or its leaders, to win voluntary compliance with laws or public orders, such as restrictions on the quantity of water that can be used, or the tariff that needs to be paid to cover the costs of delivering water services.[5] States across MENA have tried to manage scarce water resources by regulating the amount of water that can be abstracted, for example in agriculture, but these regulations are difficult to enforce. Case studies of groundwater use in Morocco, for example, describe how farmers regularly disregard public regulations because they do not believe the state should restrict their use of water, and they believe none of their neighbors in the community are following the rules. In Jordan, there are examples of water regulation officials being driven out of villages when they tried to close illegal wells.[6] Even if governments can enforce compliance by using the coercive power of the state, widespread lack of legitimacy is a threat to stability and can inhibit government policy makers from taking necessary but difficult (because they imply loss of livelihoods for farmers, for example) decisions over the management of water.

Trust consists of beliefs or expectations among people about whether others are behaving in cooperative ways for mutually beneficial outcomes, versus the opposite—noncooperative ways where each person's actions result in losses on all sides. For example, corruption is a manifestation of lack of trust. If people believe that others are likely to be extracting rents in the public sector (low trust that others are behaving honestly), they may be more likely to behave in the same way, although most people know that corruption is bad for society. Trust can be examined in the water sector as the core of why utility reforms are so difficult—whether it is reforming tariffs to cover utility operating costs, reducing water leakages and wastage (nonrevenue water), or attracting long-term financing to build infrastructure. If utility staff do not trust that their peers are performing their tasks professionally, such as by holding up decisions or not completing their assigned tasks on time or effectively, then they are arguably more likely to behave the same way, yielding outcomes of poor utility performance. For example, in Jordan, citizens do not trust that increasing tariffs will lead to improvements in service delivery. In Jordan and many other countries, citizens protest proposed tariff increases, and in areas where services are unreliable, people do not to pay their bills, contributing to the vicious cycle of low-performing, financially stressed utilities.

These seemingly abstract concepts of legitimacy and trust have real implications for the most pressing economic questions facing not only MENA's leaders, but also global financial markets. For example, why is global capital "frozen" and not flowing to finance much-needed, long-lived infrastructure for water in MENA? Global capital is not flowing sufficiently to finance water infrastructure in MENA because investors are not assured of recouping steady returns. Returns to capital are risky because available evidence suggests that the infrastructure that would be financed is not well managed for cost efficiency and revenue-raising potential. Attracting private investment, while representing citizens' interests in the face of monopoly power, requires a legitimate or credible policy environment and trusted and creditworthy state agencies. But political conditions in the region are such that global markets worry about policy legitimacy, lack of transparency, and creditworthiness. Of the 45 WSS utilities for which data were collected for this report, only five published their audited financial statements online and only two had credit ratings with the global agencies.

Evidence from the World Values Survey shows that people in MENA believe that a key role of government should be to keep prices down. There is widespread concern about governments "raising prices" and states in MENA facing protests following tariff increases.[7] This explains why governments are reluctant to raise tariffs because of the risk of widespread protests and political instability. Instead of avoiding this problem as "politically sensitive," this report argues that reform leaders and their external partners can tackle the problem through a combination of policy instruments that takes seriously the role of the beliefs and expectations that underpin the concepts of legitimacy and trust. The report tackles the policy question of what can be done to transition from a situation where lack of legitimacy and trust is preventing the state from effectively managing problems of water, and connected issues of economic transformation, to better outcomes. The following broad contours of policy ideas are sketched and may be applied and developed in specific country contexts:

- Trusted and creditworthy WSS utilities may be built through complementary reforms of incentives and management. Growing evidence suggests that giving greater autonomy to staff managing complex organizations, for example, to frontline teams reducing water losses, can improve organizational outcomes. Communication is a key complement to strengthen professional norms and peer pressure for better performance within organizations. For example, at the opening stage of Uganda's National Water and Sewer Company reforms in 2000, the chief executive officer actively encouraged staff to decide themselves what needed to be done and be accountable for whatever they agreed to do. This set the scene for reforms in which teams planned and competed for internally delegated area management contracts.[8]

- The revenue-raising potential of the state can be strengthened through communication and outreach to citizens. For example, in Cambodia, the water supply authority undertook a survey of customers to understand their willingness to pay for improved water services. It used the information from these surveys to increase tariffs successfully without public protest. The economic insights in this report suggest that there is considerable scope for public consultation if redesigned tariff structures address equity and justice considerations, with a special role for local leaders in this process. Available survey evidence from MENA suggests that citizens may have greater willingness to finance utilities through general taxation.
- An especially difficult area is trade-offs in the allocation of scarce water across the needs of agriculture and cities. Even the most advanced market economies of the world are grappling with this, with no clear blueprint or off-the-shelf solutions. The reason this is such a difficult problem is because market-based solutions do not readily apply. The world lacks sufficient understanding of how to design nonmarket institutions so that water use can be appropriately regulated and shared fairly across its competing needs. The report provides a way of thinking about this problem using the tools of public economics, recommending which "tasks" to assign to different types of government agents. This approach simultaneously yields ideas for strong central institutions to manage water as a resource and a role for greater decentralization and empowerment of local elected leaders. The general principles of a "cap-and-trade" policy regime are laid out for consideration, where the "property rights" over local water are assigned to local governments, and gains are envisioned as emerging from both reallocations within and trade among local government jurisdictions. These economic gains are envisioned to result from local information and trust in and legitimacy of local leaders to identify these opportunities for the reallocation of water. Once again, communication is a key complement to enable existing forms of local political contestation to move away from patronage, tribalism, or vote buying and toward issues of the public good. Growing evidence from across the world shows that the combination of local elections and local media for communication has significant potential to strengthen the performance of local government in delivering on public good policies.[9]

All the above ideas for policy reform are thus in the direction of giving greater autonomy and power over water management and allocation decisions to professionals staffing utilities or the leaders selected by communities to head local governments, accompanied by strategic communication to strengthen the incentives and performance norms of these agents.

The report anticipates that policy makers may question these ideas because they do not trust utility staff, local leaders, or the local political process through which communities select these leaders. That is, there is lack of trust in citizens and society among leaders. This is where the report draws on economic analysis of political institutions and what this analysis shows about the key role of local political contestation in the process of building legitimacy and trust. The report calls for using these ideas to embrace policy experimentation, impact evaluation, and learning from both success and failure. The region needs new ideas to address the persistently difficult problems of water that are growing more urgent.

The report is structured as follows.

Part I sets the stage by laying out the economics of water and describing the status quo institutions that allocate water and the overall outcomes in terms of sector financing, service delivery, and environmental stress. This part of the report builds on important prior work showing how water is becoming increasingly scarce in the MENA region and how current demand trajectories are outstripping supply. Available renewable water resources are overallocated across consumptive uses (agriculture, cities, and industry). While the key drivers of water scarcity are related to demographics and economic growth, the cost of climate-related inaction is much higher in MENA than in other regions of the world. Continuing along the current path of water management and allocation could cost the region between

6 and 14 percent of gross domestic product (GDP) by 2050—compared to a global average reduction of GDP of less than 1 percent by 2050.

The data point to difficult socioeconomic trade-offs. Water withdrawals for agriculture in MENA (83 percent) are higher than the world average (70 percent), reflecting the critical role of irrigation in such an arid region. The large share of water for agriculture contrasts with agriculture's falling contribution to GDP but significant contribution to employment. Sector institutions have struggled to win the compliance of irrigators to keep water withdrawals within sustainable limits (that is, their legitimacy to do so has been challenged). Instead, faced with the ecological limits of available renewable water resources, there has been significant growth of desalination and wastewater reuse. Countries across the MENA region account for 50 percent of global desalination and 40 percent of reuse capacity.

On average, desalinated water produced with current technologies costs four to five times more than treated surface water, using 23 times as much energy.[10] Desalinated water for agricultural production is currently only possible for the high end of use cases, such as soft fruits for export; it cannot be used for the bulk of agricultural water use cases, such as staple grain production, which have low economic water productivity.[11]

In middle-income countries, nonconventional water supply-side strategies weigh heavily on public finances. These strategies are driving up the recurrent deficits of WSS utilities, as tariffs have not kept up with the higher incremental costs associated with desalination and wastewater treatment for reuse in agriculture. Creating greater synergies between water for agriculture and water for cities relies on the WSS business model for long-term sustainable financing of the water sector.[12]

In countries across the region, government leaders are worried about increasing urban water tariffs while inefficiencies in water management by utilities remain high. Despite the high level of subsidy to cover the difference between utility costs and revenue from customers, the relatively poor quality of public WSS services experienced by households drives them to supplement these with more expensive alternative sources of water, such as bottled water and tanker trucks.

Thus, although financially viable WSS business models present opportunities to develop circular uses of water, they rely on the willingness of citizens to trust that increased tariffs will translate into improved services and the benefits of locally produced food will materialize.

This part of the report also details the uniquely high level of water control infrastructure in MENA. This water control infrastructure is both from past investments—such as in dams and canals—as well as more recent investments in desalination, wastewater treatment, and bulk water transport infrastructure. Saudi Arabia has 8,400 kilometers of bulk water pipelines. Bulk water pipelines in the United Arab Emirates transport more than 4 billion cubic meters of water a year, with more than half from desalination plants and the rest from groundwater. Even middle-income countries such as Iraq, Jordan, and Morocco have multiple inter-basin transfer mechanisms and pipelines moving water from sources to demand centers. This highly "networked" nature of bulk water management may offer opportunities for *MENA-specific* ways of managing water—developed in parts II and III of the report—such as moving water around countries, and is increasingly detached from traditional river basin management models.

Part II provides an economic framework to examine the institutions and political economy of water in MENA. This part of the report provides answers to the following questions. *Why* have governments relied excessively on supply-side investments and not addressed the negative externality in the demand for water through price and quantity regulations in MENA? *Why* are utilities unable to raise the financing needed to cover their operations and investments for reliable water services in MENA? *Why* are utilities suffering from large leakages and losses of water in MENA, and why are they so difficult to address? The answers to these questions are found in an economic framework of complex organizations of the state in which strategic interactions between thousands and millions of actors, with differing powers and authority over water allocation, aggregate into outcomes or equilibria. In the economic theory of "principal-agent relationships," one type of actor, the agent, takes actions on behalf of another, the principal. This part of

the report uses this theory to show how the lack of legitimacy and trust can be used to summarize the variety of water problems experienced in the region. Public policies, including for water, are selected and implemented by the state through a series of principal-agent relationships: (1) between citizens and political leaders, (2) between political leaders and public officials who lead government agencies, and (3) between public officials and frontline providers.

The strong, centralized leadership (principals at the highest levels of government) that characterizes political institutions in MENA has succeeded in getting capital expenditure–driven engineering projects done, such as: expanding dam storage capacity and irrigation infrastructure, building piped water networks, and using desalination plants and wastewater treatment plants for water reuse in agriculture. However, these centralized institutions are failing to resolve the competing demands for water within available limits, as they are not suited to addressing the task of building trust among the large variety of actors whose beliefs and behaviors affect how water is allocated and used.

Key reasons for the institutional failures covered in this report include (1) the allocation of water is not only decided by the ministries responsible for water, but also shaped by the uses and demands of many other ministries and sectors (agriculture, energy, environment, urban, and so forth); (2) within irrigated agriculture, the largest user, the tendency has been to focus on water conservation technologies, with much less emphasis on water conservation polices; (3) legal pluralism and assumed water rights related to historical use patterns challenge top-down quantity regulation; (4) the long-term financing needed to escape ecological water limits has been undermined by weak regulation of urban WSS services; and (5) the autonomy of service delivery institutions to improve performance has been constrained.

Ministries that perform the function of regulation are often reluctant to increase the price of water for household consumers or farmers, out of concern about possible protest reactions. The mere mention of water tariff increases can stir public anger.[13] In the rare instances where tariffs are increased, they are increased for industry or noncitizens or under the guise of technical modifications such as tariff unification. Line ministries are similarly reluctant to restrict the quantity of water used in agriculture due to concern about farmer unrest. Events such as the protest march by farmers in response to limited well closures by the river basin office in Souss-Massa, Morocco, in 2005, or farmers in the Abu Simbel region of Egypt holding 200 tourists hostage to protest inadequate levels of irrigation water in 2012, ring loud in the minds of policy makers.[14]

In the face of public protest, political leaders have strong incentives to back down from demand-side interventions and default to tackling the problems of water by building new supply-side infrastructure. Government leaders, from the highest levels to mid-tier and frontline officials, lack *legitimacy*, in the sense that they struggle to win citizens' compliance with increased tariffs and/or restrictions on the quantity of water consumed on the demand side.

In the MENA context of overallocation and legal plurality—customary, Islamic, and statutory law over both land and water (ground and surface) often coexist—the setting of water use limits (quantity restrictions) forces users into those who are considered legal and those who are not. Not recognizing assumed water rights makes implementation of quantity restrictions difficult for public officials and their frontline staff. Without renegotiating this aspect of the social contract, which is foundational to the citizen-state relationship, the legitimacy of imposed limits will be contested by users. Being closely linked to complex land reforms, the pathway to reforming individual water rights calls for intermediate steps that bring legitimacy to water allocation decisions through collective action mechanisms. These collective action mechanisms need to span all water users, not just agriculture, and draw on other available means of resolving trade-offs (for example, safety nets and livelihoods support) that are beyond the water sector.

The centralizing nature of the water policy framework across MENA has also constrained the regulation, financing, and autonomy of service delivery institutions. As set out in part I, the core problem across the vast majority of WSS utilities in MENA is that they are unable to cover even operation and maintenance costs, so they defer maintenance, resulting in low service quality.

Regulation has been focused on utility performance without sufficient attention paid to the capture and commitment problems of regulation. There are WSS utility regulatory agencies in only four countries across the region, and these are mainly focused on monitoring key performance indicators. In only one country is the regulatory agency in a position to regulate contracts with private service providers—to avert the regulatory "capture" problem. Most public-private partnerships (PPPs) in the water sector in MENA are regulated by contracts, the terms of which are not public. Without the contracts being in the public domain, there is potential for both regulatory capture and that the PPPs are profitable enclaves in a loss-making system and quite possibly on more favorable terms than the remaining public sector elements of the system. The regulators are also not in a position to make independent tariff determinations to resolve the regulatory "commitment" problem; it is the state's responsibility to ensure that the institutional mechanisms to recover its long-run capital costs are in place.

The autonomy of management within utilities is also constrained. Utility staff are not empowered or encouraged to explore ways of reducing losses, such as nonrevenue water, through better management of frontline staff within the organization. Recognizing that staff motivation and customers' payment morale play a key role in organizational performance, innovative projects have begun to complement infrastructure investment in building intrinsic motivation among the ranks of water sector organizations.[15,16,17] These recent interventions are based on both economic theory and empirical evidence from other sectors, which show that organization-wide performance depends on levels of *trust* that others in the system are trying to exert effort to improve performance.[18] If there are widespread beliefs that little effort is being exerted, this can lead to "bandwagon" behavior (of also engaging in rent-seeking, because everyone is doing it anyway) or demoralization and resignation (why try to improve if no one else is).

In sum, the problems of water allocation can be explained by the economic theory of principal-agent relationships as arising from the beliefs, expectations, and incentives of a large number of actors—within utilities and ministries and in society (citizens and farmers). These beliefs, expectations, and incentives can be summarized as:

- Lack of legitimacy for winning compliance with price and quantity regulations to address the negative externality in water consumption
- Lack of trust within public sector agencies that peers/others are motivated to find innovative ways of improving outcomes even within existing constraints
- Lack of trust among millions of water users (domestic or agricultural water users) that there is compliance with rules (payment for water and/or sticking to quotas).

Part III uses the framework to highlight policy principles and illuminate ways to build the legitimacy and trust needed to address the problem of water scarcity and service delivery. It offers ideas to reform leaders on how they can build trust and legitimacy through a three-pronged approach—greater delegation and autonomy to utilities and their managers, empowerment of locally elected government leaders, and strategic communication.

This part of the report argues that formal institutional reforms, such as, for example, PPPs, will not work without addressing the *informal institutions* of legitimacy and trust. Formal institutional reforms, copied from other places, can be ineffective because informal institutions have not changed. Independent of any formal reform, policy efforts to build legitimacy and trust are essential for MENA. They are the route through which societies can transition to better outcomes and attract long-term financing to invest in sustainable infrastructure for water security.

Building and maintaining water infrastructure ultimately relies on financing. In turn, whether from the internal budget, external partners, or the private sector, financing relies on the state's ability to cover

costs through water tariffs plus other government revenues—addressing the regulatory "commitment" problem. Where countries cannot attract private sector financing, without substantial increases in water tariffs, they need to persuade citizens and society to contribute to state revenues through tariffs, other fiscal instruments, or a combination of the two.

Policy principles span both public and private sector solutions. Policy actions to build legitimacy and trust are foundational regardless of whether public or private solutions are pursued. Even when partnerships with the private sector are likely to yield benefits, the success of these PPPs will depend on legitimacy to reform tariffs and quotas. Reflecting the challenge for any agency—private or public—to raise sufficient revenues to cover the costs of supplying water services, Guasch et al. (2014) find that 87 percent of PPP contracts in water are renegotiated within a year, a higher rate than for other types of infrastructure (78 percent for transport contracts and 41 percent for electricity contracts).

In the absence of interest from the private sector, or when governments prefer to keep water utilities public (as Joskow (2007) and Lyon, Montgomery, and Zhao (2017) find even in the United States, an advanced market economy), management reforms can be pursued within public sector agencies to promote cost efficiency and improved service delivery. There is no evidence from rigorous research that privatization per se is necessary for these efficiency and performance gains. For example, Bel and Fageda (2009) find no robust evidence in their meta-analysis of the water and solid waste sectors in Organisation for Economic Co-operation and Development countries that privatization leads to cost efficiencies.

Furthermore, the success of a PPP depends on the government representing the interests of its citizens. One of the most celebrated cases of a PPP that improved water access, and consequently health indicators, is that of Argentina. Galiani, Gertler, and Schargrodsky (2005) find that moving from federal government–owned water utilities in Argentina to long-term concessions to private companies to operate the utilities led to lower child mortality because water service provision improved and decreased water-borne diseases. Their case study of Buenos Aires suggests that the good outcomes may have had a lot to do with good regulation—the terms of the concession stipulated that 100 percent of the households had to be connected to water service and 95 percent to sewerage service by the end of the 35-year period. It also established service quality and waste treatment standards. Getting these results was a bumpy process. The Buenos Aires water concession was subject to prompt and frequent renegotiations (Gerchunoff, Greco, and Bondorevsky 2003; Clarke, Kosec, and Wallsten 2004).

Building trust in creditworthy utilities. When reform leaders face the problem of badly performing utilities—high rates of losses, high costs, little customer outreach to improve revenues, and so forth—turning around the utility involves transforming complex organizations, often with multiple tiers of management, thousands of frontline workers, and an interface to millions of customers. For the majority of utilities that are managed in the public sector, reform options involve building professional norms and intrinsic motivation for efficient public service delivery of quality water and sanitation. It is worth experimenting with these reforms, in learning-by-doing partnerships between reformist government agencies and researchers who can help evaluate and inform the design of reforms. Options include providing greater autonomy to utility managers, to restructure incentives in ways that shift professional norms and intrinsic motivation through addressing deficits in trust among workers and legitimacy between utilities and customers. The "key performance indicators" that are typically part of the hierarchical monitoring toolkit of ministries of water can be used more innovatively for potentially transformative impact. Key performance indicators can be used to feed communication among the professionals staffing a utility, to build peer-to-peer pressure and new norms and motivation for service delivery.

Decentralizing accountability for marginal water reallocations to local political institutions under a national "cap-and-trade" regime. In the case of water, where the institution of private property rights

is so fraught, due to the nature of the resource, falling back on central control does not solve the economic allocation problem. Drawing on global experience[19] and adapting it to the uniquely resource scare yet highly controlled bulk water infrastructure context of MENA, there may be innovative ways of approaching the water resource rights and allocation problem. Given the complex underlying issues of legal pluralism and assumed water rights from historical use patterns, intermediate steps that bring legitimacy to water allocation decisions through collective action mechanisms are needed before moving to a system of individual water rights. The collective action proposal put forward here is to vest the "property rights" over local water in local governments along with a "cap-and-trade" policy regime among local jurisdictions.

The principle of "cap and trade," which has been used in energy markets to address the negative externality of carbon emissions for the ambient environment, can be adapted to the common pool problem of water. However, the specifics of a "cap-and-trade" policy framework for water, proposed in this report, have distinct institutional features, chief among which is that property rights for the purpose of trading or transferring water across different uses would remain with government agencies rather than private firms as is the case in carbon trading. That is, it is important to emphasize upfront that the idea being proposed does not involve privatization of water, but rather decentralization to local governments the decisions over the marginal reallocation of water across competing uses within nationally determined water allocations.

There is an emerging precedent for this in MENA. Within the extreme water scarce context of the United Arab Emirates, each of the federated emirates has jurisdiction over its own water resources and long-term financing of the water sector. This was originally related to their federated structure, the "cap" being the requirement to manage water within their own means, which today is overseen by the Federal Ministry of Energy and Infrastructure. This requirement for each emirate to resolve the problem of reconciling the competing claims on water by agriculture and cities led to diversity in the long-term water sector financing models and cooperation (the "trade" element). Although there is still a degree of unsustainable use of groundwater, withdrawals have been falling as more is invested in reusing treated wastewater for agriculture—a growing sector since 2010. Cooperation among the emirates, the "trade" element, is seen in the way Abu Dhabi imports water from the Northern Emirates and in a series of memorandums of understanding for strategic water connections enabling the exchange of water in case of emergencies, between Dubai and Abu Dhabi as well as between Dubai and the Northern Emirates.

Generalizing and further developing this example with the proposed "cap-and-trade" approach for other countries in MENA comes from thinking about water allocation decisions as tasks assigned to different government agents within the interdependent principal-agent framework laid out in part II and within the uniquely "networked" context of bulk water management in MENA set out in part I. The key idea is to assign the responsibility and authority over different aspects of water allocation based on variation in informational advantages across agents. The principle is the same as the one being used in carbon emission abatement policies of cap and trade: that is, to enable those agents who have more information and expertise about how to reduce carbon emissions to do it in least cost ways. However, the execution of the principle—of giving decision-making power to agents according to their information advantage—would be substantially different in the case of the water sector. In water, and especially in the institutional context of MENA, the proposed policy would rely on agents within government both to devise the caps using climate and water science, and to decide whether and where to engage in trade/exchange of water with other subnational jurisdictions.

Local governments, as representatives of the communities they serve, would employ decentralized information about the relative value of water to farmers and urban residents within their jurisdiction to identify potential gains from trade. National government agencies would set science-based "caps" to which each local government would need to adhere. Aggregate "macro" calculations of the status of the

water resources in a country, and the science of their sustainability, can be used to set limits, or caps, on the amounts of water that can be consumed, abstracted, and polluted by different local jurisdictions. These caps would be enshrined in a national water strategy, through which national ministries would hold local government authorities accountable for adhering to national regulations over water use. Local government authorities, in turn, would be empowered to trade with each other, using their water entitlement under the national strategy as a starting point. Local governments would be held accountable by their constituents for their performance in managing these water entitlements, including identifying opportunities for gains from trade in water between local governments.

Just as the principle of "cap and trade" was devised using the logic of economic theory, and then applied in practice to carbon abatement policies, the idea proposed above is rooted in economic logic. Just as the application of cap and trade in energy markets has resulted in both successes and failures, depending on a variety of conditions in energy markets, so too is variation to be expected in the application of the logic to water. Outcomes of water management under the local government cap-and-trade framework proposed here would depend on the actual behavior and performance of local government agents. The key to whether good outcomes are obtained depends on the functioning of the local political market[20] through which leaders would emerge who would manage the local government's charge over water. If local political contestation yielded leaders who protested the caps imposed, or who captured the water entitlements to benefit local elites while leaving their constituents impoverished and insecure, the state would remain in the predicament in which it started. The contention behind the idea is that focused policy attention can go toward harnessing the *potential* of local political markets, where forces of contestation are already at play, to yield high-quality local leaders who can employ local information to win legitimacy and economic efficiency.

Local decision making by farmers and urban residents through their representatives in local governments has the potential to lend legitimacy to difficult trade-offs in the use of water between agriculture and WSS, compared to top-down directives from national ministries. Empowering local leaders in the policy area of managing their capped allocation of water, along with communication campaigns to encourage contestability on the basis of performance in managing water, could enable a shift in the equilibrium of low trust in society and government to a higher trust equilibrium. Such a shift is implied by available research on how contestation among local leaders can serve to coordinate expectations for higher performance. The process of local political contestation and the leaders who emerge from it serve to signal a shift in how others are behaving, which, in turn, changes individual behavior toward greater compliance with regulations (legitimacy) and trusting norms (Ostrom 2000; Acemoglu and Jackson 2015; Bidner and Francois 2013).

Communication around water scarcity and national water strategies. Communication requires investment in credible data and evidence (for example, on the hydrological cycle, infrastructure financing and future trends, and service delivery performance) as well as engagement of local political institutions—community and municipal leaders. Within the political and bureaucratic institutions through which citizens, public officials, service providers, bureaucrats, and political leaders form their beliefs or expectations, information about how others are behaving drives the transition between lower and higher equilibrium outcomes. Town halls and community meetings with local political leaders are needed, to communicate with citizens about the costs of supply-side investments to increase water resources, such as through desalination. Communication is also needed on the trade-offs in balancing water allocations between cities, agriculture, and other consumptive uses. Strategic communication can help gain acceptance for subsidy/tariff policy reforms to reduce the footprint of agriculture, and enable local government leaders to show how other state policies can address the livelihoods and income needs of farmers.

During the multiyear drought responses in São Paulo, Brazil, and Cape Town, South Africa, strategic communication by local government organizations complemented other reforms to reduce water use.

In the case of Cape Town, as storage levels in the major dams fell, the city authority put in place a series of demand management measures through communication campaigns that changed norms by shocking people into fundamentally changing their water use. Transparency and public trust were built by sharing detailed and timely information about the water crisis through the "Water Dashboard," which gave weekly updates about total water usage in Cape Town, the city's augmentation plans, dam levels, and the approaching "Day Zero" date. Together these helped in reducing water use from 183 to 84 liters per person per day. Communication changed behavior by changing peoples' expectations of what others would do.

In the case of São Paulo, South America's largest city and home to 20 million people, elevated temperatures and lack of rain in 2014 caused the worst water crisis in more than 80 years. A communication campaign worked with communities and local leaders to explain the gravity of the situation and promote water savings. Across 39 municipal authorities, workshops on water saving were run with government entities and nongovernmental organizations. The communication campaign encouraged uptake of water-saving measures by customers and bridged the interests of farmers and nonfarming citizens through purchases of water from farmers.

Turning to an irrigation-specific example, in Mozambique, information campaigns on water use efficiency shifted norms in water use patterns, reducing conflict among farmers. Experiments in which farmers were provided information to help them avoid overwatering crops at early stages of the crop cycle significantly reduced the proportion of farmers across a scheme who self-reported having insufficient water. It also reduced the number of water-related conflicts in an irrigation scheme, compared to the number prior to the information campaign.[21]

The successes of these communication campaigns were due to the way they changed behavior by changing peoples' expectations of what others would do—they shifted underlying norms of behavior and addressed the informal institutions of legitimacy and trust.

NOTES

1. As defined by Falkenmark, Lundqvist, and Widstrand (1989).
2. Chapter 3 reports on 45 utilities covering around 60 percent of the region's population.
3. Water markets have seen limited application across the world (Australia, Chile, China, and the Western United States) and require high state institutional capacity for oversight and enforcement.
4. Structural transformation of the economies in MENA is already underway, with rising urbanization and falling per capita volumes of freshwater constraining agrarian livelihoods. Although fully addressing this transformation, such as how to re-equip those who are losing their livelihoods in the process, is beyond the scope of this report, it touches on it by addressing the overarching problem of governance by the state.
5. "Legitimacy" in this sense is defined in World Bank (2011).
6. Morocco: Talbi et al. (forthcoming); Jordan: Al Naber and Molle (2017).
7. See chapter 9 and https://www.worldvaluessurvey.org/wvs.jsp.
8. Mugisha, Berg, and Muhairwe (2007).
9. World Bank (2016) provides a review of the evidence on how transparency influences local political competition.
10. World Bank (2016).
11. See chapter 4 for agricultural water productivity and D'Odorico et al. (2020).
12. See, for example, Siegel (2015).
13. https://www.jordantimes.com/news/local/draft-water-law-stirs-public-anger.

14. Talbi et al. (forthcoming).
15. https://www.giz.de/en/worldwide/43179.html.
16. Kabagambe (2020).
17. Lombana Cordoba, Saltiel, and Perez Penalosa (2022).
18. Banerjee, Duflo, and Glennerster (2008).
19. The global experiences of water reallocations presented in chapter 7 show that although water use limits are generally set at a basin or aquifer scale (a hydrological unit), the role of enforcement and accountability for operating within that limit often falls to local (political) jurisdictions rather than technical water institutions.
20. See chapter 9 on local political contestation and chapter 11 on the role of local political markets in water management.
21. Christian et al. (2018).

REFERENCES

Acemoglu, D., and M. O. Jackson. 2015. "History, Expectations, and Leadership in the Evolution of Social Norms." *Review of Economic Studies* 82 (1): 1–34.

Al Naber, M., and F. Molle. 2017. "Controlling Groundwater over Abstraction: State Policies vs. Local Practices in the Jordan Highlands." *Water Policy* 19 (4): 692–708. https://doi.org/10.2166/wp.2017.127.

Banerjee, A. V., E. Duflo, and R. Glennerster. 2008. "Putting a Band-Aid on a Corpse: Incentives for Nurses in the Indian Public Health Care System." *Journal of the European Economic Association* 6 (2-3): 487–500.

Bel, G., and X. Fageda. 2009. "Factors Explaining Local Privatization: A Meta-Regression Analysis." *Public Choice* 139: 105–19. https://doi.org/10.1007/s11127-008-9381-z.

Bidner, C., and P. Francois. 2013. "The Emergence of Political Accountability." *Quarterly Journal of Economics* 128 (3): 1397–448.

Christian, P., F. Kondylis, V. Mueller, A. Zwager, and T. Siegfried. 2018. "Water When It Counts: Reducing Scarcity through Irrigation Monitoring in Central Mozambique." Policy Research Working Paper 8345, World Bank, Washington, DC.

Clarke, G., K. Kosec, and S. Wallsten. 2004. "Has Private Participation in Water and Sewerage Improved Coverage? Empirical Evidence from Latin America." Policy Research Working Paper 3445, World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/13898.

D'Odorico, P., D. D. Chiarelli, L. Rosa, A. Bini, D. Zilberman, and M. C. Rulli. 2020. "The Global Value of Water in Agriculture." *Proceedings of the National Academy of Sciences* 117 (36): 21985–993. doi:10.1073/pnas.2005835117.

Falkenmark, M., J. Lundqvist, and C. Widstrand. 1989. "Macro-Scale Water Scarcity Requires Micro-Scale Approaches." *Natural Resources Forum* 13: 258–67.

Galiani, S., P. Gertler, and E. Schargrodsky. 2005. "Water for Life: The Impact of the Privatization of Water Services on Child Mortality." *Journal of Political Economy* 113 (1): 83–120. https://doi.org/10.1086/426041.

Gerchunoff, P., E. Greco, and D. Bondorevsky. 2003. "Comienzos diversos, distintas trayectorias y final abierto: más de una década de privatizaciones en Argentina, 1990-2002." ILPES. http://hdl.handle.net/11362/7287.

Guasch, J. L., D. Benitez, I. Portabales, and L. Flor. 2014. "The Renegotiation of PPP Contracts: An Overview of Its Recent Evolution in Latin America." International Transport Forum Discussion Paper 2014/18, Organisation for Economic Co-operation and Development, Paris.

Joskow, P. L. 2007. "Regulation of Natural Monopoly." In *Handbook of Law and Economics*, vol. 2, edited by A. M. Polinsky and S. Shavell, 1227–348. Amsterdam: Elsevier. https://doi.org/10.1016/S1574-0730(07)02016-6.

Kabagambe, A. N. 2020. “Interim Report 2020: Africa Group 1 Constituency.” World Bank, Washington, DC.

Lombana Cordoba, C., G. Saltiel, and F. Perez Penalosa. 2022. “Utility of the Future: Taking Water and Sanitation Utilities Beyond the Next Level 2.0 – A Methodology to Ignite Transformation in Water and Sanitation Utilities.” World Bank, Washington, DC. http://documents.worldbank.org/curated/en/099325005112246075/P1655860d146090dc097dc0165740604044.

Lyon, T. P., A. W. Montgomery, and D. Zhao. 2017. “A Change Would Do You Good: Privatization, Municipalization, and Drinking Water Quality.” In *Academy of Management Annual Meeting Proceedings: Atlanta 2017*, edited by S. Taneja, 10499–501. Briarcliff Manor, NY: Academy of Management. https://doi.org/10.5465/AMBPP.2017.19.

Mugisha, S., S. V. Berg, and W. T. Muhairwe. 2007. “Using Internal Incentive Contracts to Improve Water Utility Performance: The Case of Uganda’s NWSC.” *Water Policy* 9: 10.2166/wp.2007.010.

Ostrom, E. 2000. “Collective Action and the Evolution of Social Norms.” *Journal of Economic Perspectives* 14 (3): 137–58. doi:10.1257/jep.14.3.137.

Siegel, S. M. 2015. *Let There Be Water: Israel’s Solution for a Water-Starved World*. New York: Thomas Dunne Books.

Talbi, A., C. Dominguez Torres, S. Bahije, D. de Waal, S. Dahan, R. Trier, and H. Benabderrazik. Forthcoming. “The New Normal of Allocating Water Scarcity: Adapting Water Resources Management and Services to the Changing Future.” World Bank, Washington, DC.

World Bank. 2011. *World Development Report 2011: Conflict, Security, and Development*. Washington, DC: World Bank.

———. 2016. *High and Dry: Climate Change, Water, and the Economy*. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/23665.

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DESPITE MASSIVE INFRASTRUCTURE INVESTMENTS, countries in the Middle East and North Africa (MENA) region continue to face unprecedented water scarcity due to climate change, population growth, and socioeconomic development. Current policy regimes for managing water across competing needs are primarily determined by state control of large infrastructure. Policy makers across the region understand the unsustainability of water allocations and that increasing investments in new infrastructure and technologies to increase water supply place a growing financial burden on governments. However, standard solutions for demand management—reallocating water to higher value uses, reducing waste, and increasing tariffs—pose difficult political dilemmas that, more often than not, are left unresolved. Without institutional reform, the region will likely remain in water distress even with increased financing for water sector infrastructure.

The Economics of Water Scarcity in the Middle East and North Africa: Institutional Solutions confronts the persistence and severity of water scarcity in MENA. The report draws on the tools of public economics to address two crucial challenges facing states in MENA: lack of legitimacy and trust. Evidence from the World Values Survey shows that people in the region believe that a key role of government is to keep prices down and that governments are reluctant to raise tariffs because of the risk of widespread protests. Instead of avoiding the "politically sensitive" issue of water scarcity, this report argues that reform leaders and their external partners can reform national water institutions and draw on local political contestation to establish a new social contract. The crisis and emotive power of water in the region can be used to bolster legitimacy and trust and build a sustainable, inclusive, thriving economy that is resilient to climate change.

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