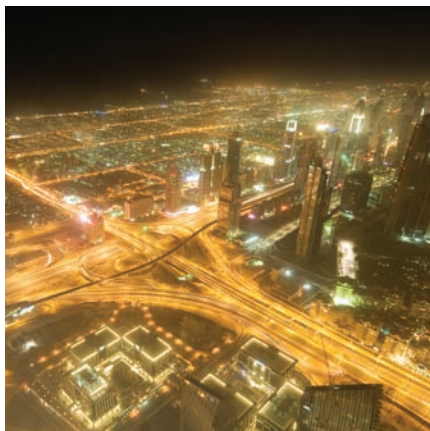


The Middle East and North Africa at Risk 2010



The views expressed in this publication do not necessarily reflect the views of the World Economic Forum.

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Preface

In a global world, where every stakeholder is increasingly exposed to natural and systemic risks, we can do much better in terms of building both global and institutional capabilities around risk resilience. More than ever, deeper and shared insight is needed to respond effectively to global challenges. In particular, understanding the systemic nature of global risks can contribute to closing the widening gap between emerging risks and our collective ability to understand and respond in the global public interest.

The World Economic Forum's work on global risks offers a unique perspective in some of the most pressing global challenges facing industries and governments in the coming decade. By focusing on risk context and interconnectedness, the Forum provides frameworks for analysis, dialogue and collaborative action to help decision-makers improve the resilience of global, regional and industry systems. The Forum also highlights the opportunities that unfold when risks and their interdependencies are better understood.

As part of this effort, the *Middle East at Risk 2010* report is an important publication that draws on the insights of the Forum's Arab Business Council and Network of Global Agenda Councils. It builds on *Global Risks 2010*, providing relevant macro analyses that are particularly important for the Middle East and North Africa (MENA) region. The report focuses on three risk areas that are specifically relevant to the region: water scarcity, energy security and underinvestment in infrastructure. Not only are these pressing issues in their own right given the region's social, geopolitical, economic and environmental context, but all three are also highly interconnected. Examining these interlinkages provides greater insight on the potential for contagion and risk compounding, as well as illuminating the levers and trade-offs involved in risk response by the public and private sectors. The report also examines the potential for highly functional, regionally focused institutions and mechanisms to support domestic action in both the private and public sectors, and highlights the benefits of developing regional networks for sharing physical and knowledge-based assets relevant to risk.

Over the next year, the Forum will build on its leading collaborative multistakeholder network of government, business and civil society leaders and inaugurate a Global Risk Response Network to serve as a virtual locus of interactions on core global risks. It will integrate the foremost thinking on a broad range of risks, enhancing policy and business decision-making by providing a timely and relevant depiction of global risks.

I hope that this report, and accompanying discussions at the World Economic Forum on the Middle East and North Africa in Marrakech, Morocco, in October 2010 and beyond, will enable the MENA region to turn global risks into opportunities - helping all stakeholders better understand and respond to a range of global risks in a more collaborative, integrated and proactive way.



Klaus Schwab
Founder and Executive Chairman
World Economic Forum

Executive summary

The World Economic Forum's *Global Risks 2010* report highlighted three trends that characterize the global risks landscape: high and increasing levels of global risk interconnectedness; the power of “creeping” or chronic factors; and the growing challenge of governance deficits.

These trends are all highly visible in the MENA region and are particularly evident in the three global risks discussed in detail in this report: water scarcity, energy security and underinvestment in infrastructure. These all manifest as chronic risks, acting as limits to growth and exacerbating other risks. In addition, all three risks directly influence one another and are powerfully driven by population and economic growth trends as well as other regional contextual factors. These characteristics mean that response strategies need to be highly integrated.

Despite significant regional disparities, in particular between the prosperous Gulf Cooperation Council (GCC) countries and the rest of the region, and additionally between oil-exporting countries and oil-importers, several overarching trends emerge for the MENA region:

- As one of the world's driest regions, **water scarcity** critically affects the MENA region's socio-economic condition. The amount of water available per person is expected to fall by 2050 by more than half due to growth and climate change trends. With agriculture accounting for more than 85% of freshwater withdrawals and energy-intensive desalination being the only scalable source of water supply in the region, more integrated approaches to water management are required, particularly in linking water scarcity to food and energy security.
- While the MENA region looks energy-rich, holding 56% of the world's proven oil reserves, it is on a downward trend in terms of **energy security**. MENA countries are approximately 60% more energy-intensive than OECD countries. Environmental degradation, resource depletion, limited conversion capacities and unbalanced regional distribution of fossil fuel resources, therefore, have strong constraining effects on MENA economies. Interlinkages with the region's water supply because of heavy reliance on desalination will impose increasingly tough choices on resource allocation. The renewable energy sector still has a long way to go to contribute to energy security and the private sector's willingness to invest in new technologies is currently lacking.
- **Underinvestment in infrastructure** poses direct barriers to growth in MENA countries, for example through a 20% shortfall in installed electricity capacity across the region. The legal and regulatory environment in the MENA region, or “soft” infrastructure, often contains significant barriers for private sector participation in infrastructure projects, making it difficult to match supply with the requisite levels of demand. Developing regionally focused infrastructure (particularly for energy, water and transport) could create economies of scale, opportunities for investment and increase the region's resilience to acute failures.

While enhanced regional multistakeholder coordination could significantly enhance the resilience of individual countries and the region as a whole, institutional capacities for such initiatives are currently lacking. Existing regional institutions, such as the GCC, have so far failed to address the above risks in a comprehensive manner. This report therefore aims to help leaders from the private and public sectors to consider ways of building resilience through increased cross-sector and cross-country collaboration.

Global risks, regional concerns

THE GLOBAL RISKS LANDSCAPE POSES COMPLEX CHALLENGES FOR THE MENA REGION

The *Global Risks 2010* report (GRR) noted that global risks are increasingly interconnected. Shocks and vulnerabilities are truly global, even if impacts can still differ at the local level. Thus, there is an ever-greater need for integrated and more systemic approaches to risk management and response by public and private sectors alike, as well as greater focus on risk context.

The report further highlighted that despite the huge impact of sudden shocks, such as economic crises, terrorist attacks or natural catastrophes, some of the biggest risks facing the world today may be from slow failures or creeping risks. These failures and risks, emerging over a long period of time with their potentially enormous impact and long-term implications in limiting growth and increasing the probability of acute failure, can be vastly underestimated. As a recurring theme from previous years, the report also stressed the increasing risks arising from global governance gaps.

Increasing insights and awareness about these trends in the global risks landscape is key to building more resilient systems. This is particularly important for the MENA region where these overall trends of high risk interconnections, creeping risks and governance deficits are particularly prevalent. By analysing three highly interconnected global risks, water scarcity, energy security and underinvestment in infrastructure, the current report intends to shift the focus of decision-makers towards greater resilience at the regional level.¹

THE REGIONAL CONTEXT FOR GLOBAL RISKS



“The geopolitical context, particularly with regard to possible global tensions with Iran, is critical to the future of energy and water security for the Gulf countries.”

Mohammed Bin Essa Al Khalifa

Chief Executive, Bahrain Economic Development Board, Bahrain

It is important to understand the contextual factors that influence the way global risks emerge within the region, how global risks impact the region and how stakeholders can respond to them. For MENA, three contextual factors have a particularly powerful influence on global risks: high rates of economic and population growth; concerns regarding economic, social and geopolitical tensions and stability; and shortcomings in regional institutions to govern common challenges. All three factors heavily influence the three risks examined in the remainder of this report and therefore set the common stage for systemic regional risk management.

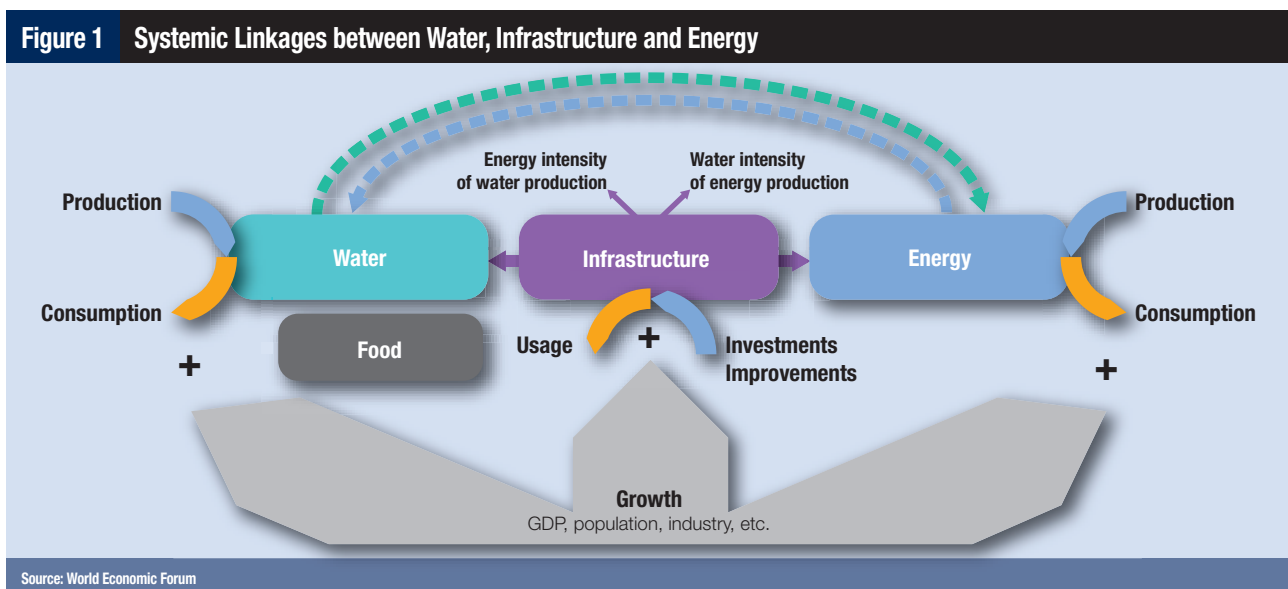
The importance of the geopolitical context

Latent geopolitical tensions spanning the region create complex uncertainties that impact water scarcity, energy security and infrastructure investments. First, they inhibit far-reaching regional cooperation on all these issues. Second, they also create direct physical threats. For the Gulf countries, Iran influences energy security both as a potential supplier of gas and as a potentially destabilizing force given its power over the Strait of Hormuz. For water security in the GCC, there are fears that military conflict in the region could lead to contamination of Gulf waters which are a key source of freshwater through desalination. And, across the region, geopolitical factors play heavily into the issue of the physical security of water, energy and infrastructure installations.

¹ The Forum's definitions of global risks and resilience are provided in the annex.

EXPLORING THREE HIGHLY INTERCONNECTED GLOBAL RISKS

Water scarcity, energy security and underinvestment in infrastructure are highly interrelated risks. Figure 1 illustrates these interconnections at the highest level. As the diagram shows, all three risks (and their associated risks such as food security) are heavily influenced by growth – in terms of underlying economic output, increases in population and shifts in industrial intensity. They also feed back into these trends, creating and enabling growth as critical input factors. All three manifest themselves primarily as chronic risks and are thereby intimately tied into the broader socio-economic system of the MENA region. Each element is a required input for the other factors: All energy production requires water and all water production and distribution requires energy, while infrastructure relates to both energy and water as an enabling factor for resource efficiency.



The strong interconnections between these three risks exacerbate the challenges of the global risk landscape for the MENA region. Shortfalls in one or more of them act as a direct limit to growth, trigger other risks and may limit the response capacity of the affected stakeholders. Furthermore, the three risks are based on complex networks and structures that can endogenously produce acute interruptions, which can easily spread to other parts of the system. Increasing fragility in one or more of them also increases the risk that external events could cause significant damage to the entire system through severe interruptions or shortages. Taken together, these risks represent a systemic threat to regional resilience that can only be addressed in an integrated manner.

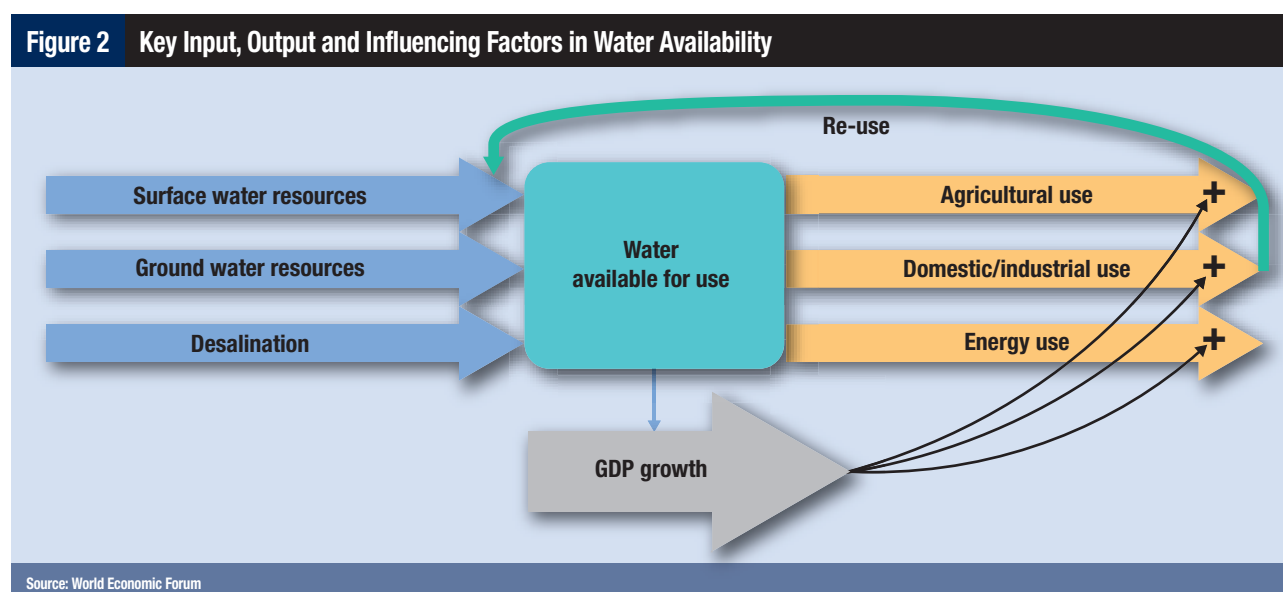
The following sections examine each risk in turn, considering recent data and trends, levers that could contribute to resilience, trade-offs faced by policy-makers and other stakeholders in responding to the risks and key questions for further discussion by regional stakeholders. The intention is thereby not to provide a prioritization of risks to the MENA region, but rather to highlight and raise awareness of some of the common threats, opportunities and choices that the region faces to induce shared responsibility for action on some of the most heavily interlinked global risks in the region.

Water scarcity

RISK DESCRIPTION AND IMPACTS

As the *Global Risks 2010* report highlights, the impact of declining quality and quantity of water will be increasingly severe in the forthcoming years. Water is so heavily interlinked with other parts of the value creation system (in particular through agriculture, food and energy production) that water scarcity is a fundamental systemic risk for both businesses and societies. The way in which decision-makers manage this risk will have a direct impact on economic growth and the socio-economic well-being of societies as competition for water from various sectors is set to increase.

Supply of water for domestic and industrial use comes from existing natural freshwater resources and/or from desalination or reuse of waste water (see Figure 2). Overall demand for water is driven by rapid economic and population growth leading to competing water requirements for industrial, energy and agricultural production as well as household use. Current trends will force tough choices and trade-offs on how to manage water resources, testing the ability of governments in the MENA region to counteract a very real and increasing risk to growth and socio-economic well-being of the region.



Direct impacts of water scarcity

- Increasing cost of water
- Lower quality of life and negative health outcomes
- Depressed agricultural yields and shortages of food
- Constraints on water-dependent industrial and energy activities
- Environmental damage

Indirect impacts of water scarcity

- Domestic social tensions over water distribution
- Geopolitical tensions over access to trans-border water resources
- Economic and environmental costs of maintaining water supply
- Decreasing energy security through energy needs for maintaining water supply

MAJOR TRENDS AND UNCERTAINTIES

CURRENT STATE: A HIGHLY WATER-DEPRIVED REGION



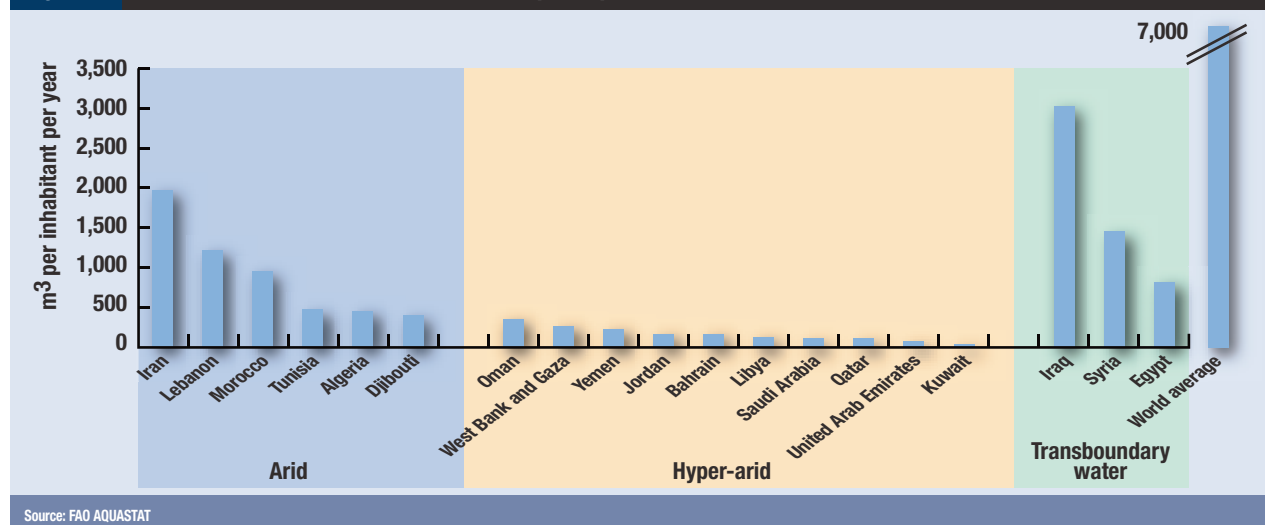
"Truly, there is nowhere on the planet more than this region that has a greater need to 'reduce, recycle, reuse' water."

Arjun Thapan

Special Senior Adviser to the ADB President for Infrastructure and Water, Asian Development Bank, Manila; Global Agenda Council on Water Security

According to World Bank estimates, the MENA region has a per capita water availability of around 1,100 cubic metres per year (compared to a worldwide average of 7,000) making it one of the most water scarce regions of the world. While almost all countries of the region face water scarcity, the MENA region is exposed to these challenges in different ways: countries such as Iran, Lebanon or Morocco have varying water supplies and mainly face an internal distribution challenge; hyper-arid countries particularly of the GCC face extreme renewable freshwater shortages while trying to support extremely high levels of water consumption through desalination of sea water; and countries such as Iraq or Egypt rely on trans-boundary water bodies that require international cooperation for water resource management (see Figure 3).

Figure 3 Total actual renewable water resources per capita in MENA



Against this, the region has to sustain a rapidly growing population with increasingly water-intensive consumption habits. At current levels, the MENA region has to sustain almost 5% of the world's population with less than 1% of the world's renewable freshwater resources. Combined with robust economic and demographic growth, increasing living standards and urbanization, these trends directly translate into rapidly growing water consumption and a further reduction of water resources.

The Intergovernmental Panel on Climate Change (IPCC) anticipates further significant reduction of water levels in the region. Their estimates suggest rainfall declining by 10% to 25%, run-off declining by 10% to 40% and water loss through evaporation increasing by 5% to 20%. These trends could make the amount of water available per person in the MENA region fall by 2050 by more than half.

The MENA region is therefore particularly sensitive to the way water is managed and much more vulnerable to water risks than other regions of the world. World Bank estimates hold that inefficient water management already costs MENA economies 0.5% and 2.5% of GDP every year, and the trends suggest a rapid increase of this risk in the years to come. Responding to the challenges will impose tough choices on water allocation and new levels of cooperation between the different stakeholders of the water system.

AGRICULTURE AND FOOD PRODUCTION DRIVE WATER RISKS AND VICE VERSA

Agriculture and food production are the main drivers of water consumption in the MENA region, with irrigated agriculture accounting for more than 85% of total regional freshwater withdrawals. At the same time, there are growing water demands from other users such as industries and households.

The Forum's Water Initiative highlighted in its 2009 report *Managing Our Future Water Needs for Agriculture, Industry, Human Health and the Environment* that a high level of agricultural water use limits growth and expansion in other sectors. Governments in the region will therefore be increasingly pressured to allocate scarce water resources for uses with higher added-value than agriculture. This is particularly true for countries (particularly in the Maghreb) that use large volumes of water to produce food crops for export.

The Food-Water-Energy Nexus

While this report focuses on the systemic linkages between water, energy and infrastructure, another key set of interconnections exists between energy, water and food. Raised as a concept of critical importance to global development during the World Economic Forum's Summit on the Global Agenda in 2009, the "Food-Energy-Water Nexus" is being explored through inter-industry dialogue and through combined initiatives in countries such as Jordan and Egypt. As with water, energy and infrastructure, the central challenge of the food-energy-water nexus is the need for coordination between diverse stakeholders, many of whom often lack the incentives or institutional structures required for effective action. However, the potential for improvements that create positive change across all three areas provides significant opportunities for the future of sustainable growth and development.

ENERGY DRIVES WATER RISKS AND VICE VERSA

As noted in Figure 2, the energy sector is another important driver of water demand. Large amounts of water are needed at all stages of energy production, just as large amounts of energy are needed for the extraction, conveyance, treatment and distribution of water. The predicted 55% increase in the region's energy demand by 2030 will not only add direct stress to water resources (depending on the freshwater intensity of the technologies implemented for meeting this demand) but will also limit the availability and increase the cost of energy for water provision.

This interconnection is particularly important for the MENA region given its heavy reliance on energy-intensive desalination for its freshwater provision. Countries in the region are the biggest users of desalination technology, with over 50% of the world's capacity providing approximately 90% of freshwater needs. Even though Gulf States such as Saudi Arabia, the United Arab Emirates and Kuwait use dual purpose power and desalination plants on a major scale, desalination remains by far the most energy-intensive means of freshwater supply. Further energy is needed to transport desalinated water from coastal regions to urban areas where water is needed. For some countries in the region, energy security could, therefore, increasingly constrain freshwater supply.

INCREASING INFRASTRUCTURE REQUIREMENTS

Underinvestment in water-related infrastructure creates deficiencies in the extraction, distribution and use of water. This includes upstream infrastructure such as the capacity and efficiency of wells, dams, treatment and desalination facilities, as well as downstream infrastructure such as water transmission pipelines to bring water to consumers and irrigation systems in the agricultural sector with minimal loss due to leakage or evaporation.

A large part of the region's infrastructure investments has concentrated on upstream capacities, binding significant resources in one part of the water system. Large-scale projects, such as Libya's Great Man-Made River, transferring fossil aquifer water from below the Sahara desert to population centres in the north of the country as well as large-scale desalination plants in Saudi Arabia or the United Arab Emirates are representative of this trend. To meet current levels of water demand, the region will need to significantly increase its desalination capacity over the next years. While there are natural limits to the expansion of desalination (environmental experts point to rapidly increasing levels of salt in the Gulf as a result of excessive desalination) it also exposes these countries to the risks of acute failures such as in the event of oil spills or other contaminations of Gulf waters.

Furthermore, there is a risk that such large-scale investments in upstream capacities limit the availability of resources and political will for alternative tools to increase water availability such as demand management, as well as leakage reductions and overall efficiency improvements of downstream water infrastructure. The World Bank and other observers have repeatedly pointed to major water losses throughout the region incurred by dilapidated water distribution networks, lacking investments in network maintenance and false consumer incentives through high levels of subsidies.

The prevalent underpricing of water in the MENA region not only encourages waste and use of water for low value-added purposes, but also discourages necessary investment in water saving technologies. As the *United Nations World Water Development Report* highlights, water pricing systems that hide the true cost of water are one of the main reasons for underinvestment in water infrastructure.

LEVERS AND TRADE-OFFS

MANAGING WATER DEMAND BY INCREASING EFFICIENCY OF USE



“Finding ways to encourage people to use water more efficiently is an important policy initiative for the MENA region.”

Lubna Olayan

Deputy Chairperson and Chief Executive Officer, Olayan Financing Company, Saudi Arabia; Chair, Arab Business Council, World Economic Forum

Creative water saving solutions through improved incentive structures and enhanced efficiency of use are a key lever for addressing water scarcity in the MENA region. As with energy consumption (discussed in the following section) low levels of water efficiency, even despite increasingly scarce resources, can be partially explained by artificially low prices thanks to government subsidies; consumers and businesses face little incentive to save water. This is particularly true for agricultural water use, where subsidies are often particularly prevalent. Given that 85% of the region’s freshwater withdrawals come from this sector, on-farm efficiency improvements through price incentives could go a long way to reducing the region’s water challenges.

However, raising prices to reflect the true cost of water as a demand management strategy has significant social implications in the context of the MENA region; social stability may be affected if price rises are not managed progressively so as not to disadvantage poor consumers. With this trade-off in mind, careful consideration of means to progressively price water sources are being considered in the region. A further strategy to consider is the substitution of direct subsidies in certain cases for infrastructure grants to enhance water efficiency. Such programmes may result in maintaining current costs to consumers and businesses, and reasonable supply levels while reducing overall water use.

MANAGING WATER DEMAND THROUGH THE FOOD SUPPLY CHAIN



“It is of paramount importance to get the maximum crop per drop in MENA.”

Margaret Catley-Carlson

Patron, Global Water Partnership (GWP), Canada; Global Agenda Council on Water Security

Improving agricultural production as well as food chain efficiency through choice of crops, improved irrigation, storage and transport are all important areas for decreasing the water intensity of agriculture. But such technical solutions can only alleviate water risk in the short term.

Oil-rich MENA countries are, therefore, starting to offshore agriculture to free water resources from the domestic agriculture sector and import “virtual water” in the form of food. Saudi Arabia, formerly one of the largest wheat growers in the MENA region, announced plans to phase out domestic cereal production by 2015. Distrust in the functioning of international food markets entices solvent food importers from the region to buy or lease arable land in water-rich countries in Africa and South Asia.

However, the long-term viability of such deals cannot be seen in isolation from the international food trade system. At the height of the 2008 food price spikes, several countries already imposed trade controls on the export of commodities. Under conditions of acute scarcity in host countries, enforcement of long-term land/food deals could come at extreme social and political costs. Saudi Arabia's land deal with Pakistan and the domestic food crisis emerging from the catastrophic floods of 2010 is a case in point.

Domestic implications of such deals are also crucial. First, in countries with large rural populations such as Egypt, reductions of domestic agriculture will accelerate existing trends of urbanization and urban unemployment. Second, there is a danger that reliance on food imports for alleviating water scarcity slows down the pace of reforms to improve domestic water efficiency and reduces the sense of urgency for difficult demand management decisions.

The World Economic Forum supports integrated water management strategies in Jordan

Catalysed at the 2009 World Economic Forum on the Middle East, the Forum's Water Initiative has been working with the Jordanian government, Jordan Chamber of Industry, American Chamber of Commerce, USAID and GTZ on a major new water partnership: the Jordan Business Alliance on Water (JBAW) fosters cross-sector collaboration to develop a stream of new water projects that benefit all aspects of Jordanian society, making best use of scarce water resources and attracting private as well as public financing. Partners are now jointly developing the first wave of projects. One project is the treatment and reuse of waste water in industrial processes for the stone and marble cutting sector.

The next phase of the work is an alignment between the Forum's Water Initiative and the 2030 Water Resources Group (WRG). This alignment will bring together the analytical expertise of the WRG, with the multistakeholder platforms (including the JBAW) the Forum has facilitated. The project will follow the **ACT process** – undertaking Analysis to help Convene and build Coalitions to develop Transformational policies, programmes, projects and partnerships – aimed to create “proof points” that such a coordinated platform approach can work.

The project will support the development of national and regional analysis on gaps between water supply and demand that lead to prioritized recommendations and sector strategies, followed by building local public-private coalitions to identify potential reform projects, programmes and policies that support the government's reform activities and partnerships that leverage expertise from the private sector (technology, expertise and advice) to assist the public sector in their water planning and management activities.

MANAGING SUSTAINABLE WATER SUPPLY

Current practices for assuring water supply through overuse of natural aquifers and excessive desalination without regard for sustainability and environmental consequences are endangering the long-term supply of water in the MENA region. A key lever for turning water risks into opportunities for the region, therefore, lies in increasing the sustainability of water supply practices.

The use of renewable energy for desalination and successive transport of water from coastal desalination plants to population centres could be a significant contribution to sustainability. Another key area for sustainable water supply is the appropriate use of treated water, which has a huge unexplored potential in the region. But investments in such sustainable water supply measures are currently lacking.

FOSTERING COOPERATION ON SUPPLY AND DEMAND MANAGEMENT

The region's water risks are inherently transnational, given that neighbours share similar water management challenges and many of the region's water systems are shared across borders. Collaborative strategies, both domestic and regional, therefore have the potential to enhance the efficiency of water use and to better manage access to scarce, shared resources. Low levels of trust and trans-border cooperation combined with deficiencies in institutional arrangements for bringing together the different stakeholders of the water system make it difficult to develop integrated solutions.

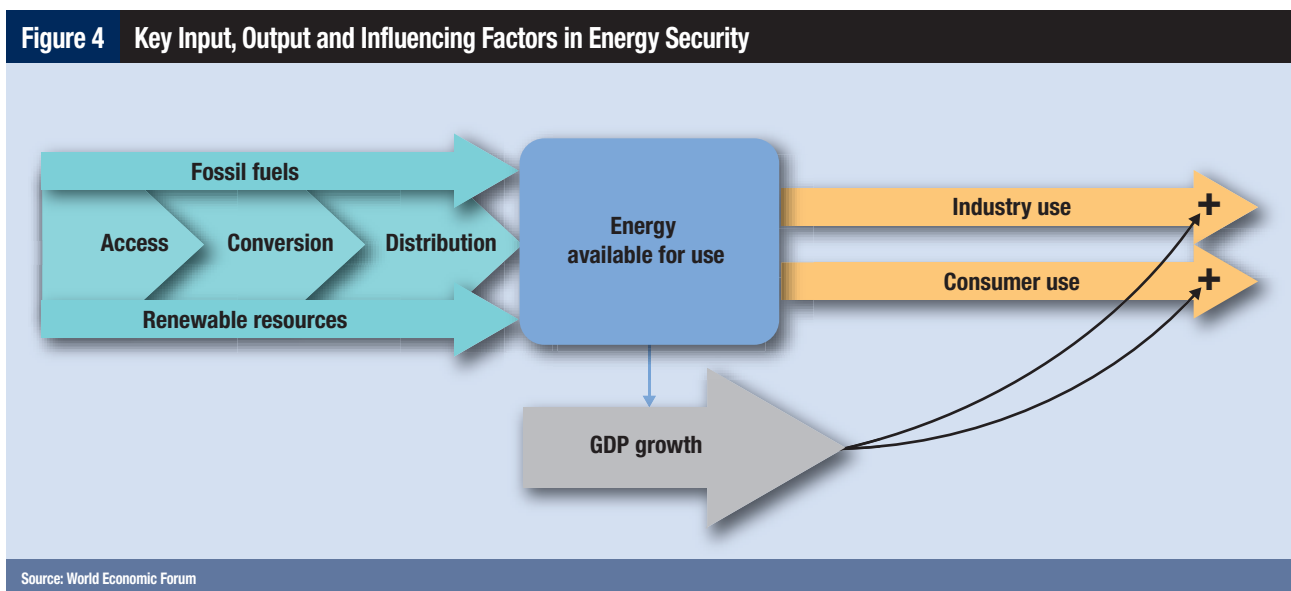
The increasing scarcity of water will necessarily increase tensions between different users of water sources. More competition over limited supplies between communities, sectors and countries will require unprecedented levels of cross-regional and cross-sectoral cooperation. The region will therefore need new initiatives to broker collaborative solutions, particularly when considering the need for integrated water, energy and food strategies as well as for regional approaches to share water resources such as in the Nile, Euphrates and Tabaria basins.

Energy security

RISK DESCRIPTION AND IMPACTS

Energy security is the uninterrupted physical availability of energy at an affordable price while respecting environmental concerns. At first glance, the enormous energy resources of some of the countries in the MENA region would reduce the region's overall energy security risks. The MENA region holds 56% and 41% respectively of the world's proven oil and gas reserves and will remain a leading player in the world's energy supplies through to 2030 with fossil fuels expected to support more than 80% of the world's growth in energy demand.

However, there are significant differences in the energy resources of the individual MENA countries and the volume of fossil fuel reserves affect energy policies, including infrastructure investments, consumption patterns and energy diversification. Examined in a broader context, energy security goes beyond the mere availability of energy resources. It has to be viewed in the context of a system that combines access to resources and the ability to convert and distribute energy (e.g. in the form of electricity) with specific levels of demand that are driven by growth (see Figure 4). Across the region, countries are facing challenges with one or more of these elements. With a particularly energy-intensive growth pattern, the region has entered into an escalating feedback cycle of exponentially rising demand that will be increasingly difficult to meet as fossil resources decline and climate change imposes a move to more sustainable low-carbon economies.



Direct impacts of lacking energy security

- Failures in critical services because of a lack of electricity
- Economic cost of ensuring supply
- Economic loss from energy-constrained industry
- Lower quality of life

Indirect impacts of lacking energy security

- Environmental cost of ensuring supply
- Geopolitical tensions over energy resources
- Social tensions
- Water scarcity (particularly for countries relying on desalination)

MAJOR TRENDS AND UNCERTAINTIES

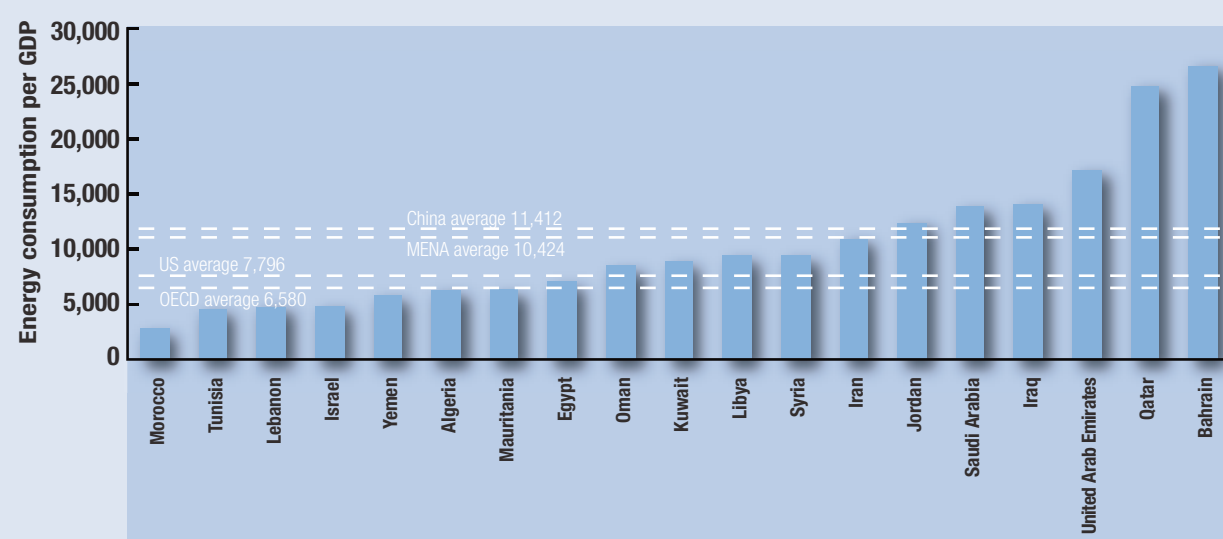
CURRENT STATE: A REGION CHARACTERIZED BY HIGH ENERGY INTENSITY

The MENA region's total consumption of energy has grown faster over the past decades than any other region in the world. As indicated in Figure 5 below, and stressed in World Bank reports, the region is approximately 60% more energy-intensive than OECD countries (measured by energy consumption per GDP) and the trend is increasing. The MENA region's primary energy demand is expected to grow at 2.9% a year through 2030 and electricity demand alone is expected to double by 2020.

This trend exposes the region to energy security risks in terms of its access, conversion and distribution capacities. If current trends in energy intensity continue, the region may not be able to continue to deliver affordable and reliable energy to meet the needs of the population and support continued economic growth. Therefore, countries may have to make a trade-off between generating export revenue and meeting domestic needs. However, these risks play out differently across the region.

Iran has had to ration petrol as it struggles to align supply and demand; Maghreb countries lack basic resources and conversion capacities to keep up with the demands of steep population growth; Kuwait has imported LNG and most GCC countries are struggling with accessing easily convertible resources (such as gas) to fuel their industries as oil fields mature and they seek to optimize oil exports. The region is expected to see one of the largest increases in gas consumption for power generation over the next two decades. Countries have to reconsider feedstock for power generation plans that were based on natural gas as existing gas exporters such as Algeria and Egypt will increasingly have to meet domestic power generation demands and reduce exports. The focus on natural gas increases the importance of Iran, Iraq and Libya as sources of natural gas, highlighting the value of gas finds such as the recent discoveries by Israel.

Figure 5 Energy Intensity in the MENA Region²



Source: EIA, 2007

² Energy intensity is measured as 2007 total primary energy consumption per dollar of gross domestic product using purchasing power parities, (Btu per (2005) US dollars)

The region is particularly vulnerable to energy reliability and sustainability risks, triggering down also to related areas such as water scarcity (given the region's heavy reliance on energy-intensive desalination as discussed in the previous section). Energy reliability, including the transmission and distribution of energy, is straining under current infrastructure capacity in both poorer and wealthier countries of the region (oil-rich Gulf countries have been faced with electricity outages and brownouts in the summer).

Looking at sustainability, CO² emissions from the region could triple over the next three decades. This will exacerbate rapidly rising pollution levels. For example, the health impacts of particulate matter are estimated to cause damage costing the equivalent of about 0.9% of the region's gross national income.

DEMOGRAPHICS AND GROWTH PATTERNS DRIVE ENERGY RISKS

High oil and gas receipts increased the purchasing power of energy-producing states significantly through to 2007. Increased standards of living are promoting energy-intensive lifestyles including ownership of private cars, air conditioning, refrigerators and other electrical goods – a trend exacerbated by the region's high demographic growth rates.

The region's economies are also shifting from agriculture to industry and manufacturing. Oil-rich countries have ambitious growth plans based on leveraging cheap energy to develop value-added industries such as petrochemicals, aluminium smelting, cement and fertilizers. However, these economic diversification goals are driving large power demands and require energy-demanding desalinated water.

The level of energy consumption is also driven by subsidies and low residential and commercial electricity rates. Low energy prices, while helping to bring energy to low-income households, can also discourage efficient use of electricity in higher income households. Bahrain, Qatar, Saudi Arabia and the United Arab Emirates have some of the lowest fuel prices in the region and relative to other countries and regions, which, in turn, supports an accelerating expansion of private vehicles.

INFRASTRUCTURE REQUIREMENTS

The energy infrastructure in the region is not meeting demand. For example, the World Bank estimates that the installed generation capacity of the electricity sector is 20% below the current MENA region aggregate demand for electricity. Without significant investments, many countries will be unable to meet future demands.

Poorly performing and insufficient energy infrastructure has significant impact on the economic growth of the region, overall entrepreneurship and time and costs involved in starting new business. For example, World Bank Enterprise Surveys show that firms consider electricity one of the biggest constraints to their business. The constraints stem from inadequacies of electricity service – access to electricity, electricity distribution and the reliability of supply – as well as from connection costs.

In addition, most countries in the region experience significant transmission and distribution losses in power systems. A study of 11 MENA countries found that the equivalent of 17.9 GW or 13.3% of total installed capacity was lost in transmission. Reducing these losses to 10% would provide a savings of US\$ 5.5 billion equivalent in new infrastructure investments.

Resolving these shortcomings will require infrastructure investments representing approximately 5% of the MENA region's GDP or an annual investment of US\$ 100 billion. Some countries will need to invest the equivalent of 9.2 % annual GDP 2008 – 2015 (US\$ 75 to 100 billion/year) to sustain their economic growth prospects; one-third of the investment will be required to simply maintain existing generation and transmission assets. Currently, about half of this amount is mobilized.

LEVERS AND TRADE-OFFS

INCREASING EFFICIENCY AND MANAGING ENERGY DEMAND



“Governments should reduce energy subsidies to entice the private sector to direct investments into renewables.”

Talal Al Zain

Chief Executive Officer, Bahrain Mumtalakat Holding Company, Bahrain

A region-wide focus on energy efficiency must be a core element in managing the MENA region's energy security challenge. As the Forum's *Energy Update 2010* highlights, end-use energy efficiency is a relatively rapid and cost-effective method to address energy demands as compared to increasing supply; it has the added benefit of helping to reduce emissions. Actions can include a managed reduction in energy subsidies and other initiatives focusing on energy efficiency both in the business and consumer segments – including technology development, energy efficiency regulations and national energy plans. Efforts to reduce growth in energy demands have the additional benefit of reducing the cost of energy subsidies to release financing for energy investments.

MANAGING THE SUPPLY SIDE OF ENERGY SECURITY THROUGH ALTERNATIVE SOURCES

Many observers have highlighted the promise of renewable energy as a means of addressing the MENA region's energy security challenges through generating sustainable energy for domestic consumption and freeing up non-renewable resources for export. To date, many countries have set targets for renewable energy production; there are projects in various MENA countries (such as solar power projects in the United Arab Emirates, Morocco, Algeria and Egypt, as well as wind power projects in Morocco, Jordan and Egypt). The newly created International Renewable Energy Agency (IRENA) is headquartered in Abu Dhabi, signifying the region's growing focus on renewable energy.

However, overall investment in renewable energy projects has so far remained below expectations and less than 0.3 % of the MENA region's electricity capacity is currently generated by renewables. As indicated in Forum interviews, the private sector is particularly concerned about the level of human capital required to operate such technology-intensive mechanisms and about lacking infrastructure for exporting renewable energy to consumers in Europe and beyond.

Another option on the agenda of decision-makers is nuclear energy. Notwithstanding the strong interconnections with geopolitical risks in the region, several MENA countries are considering new developments in this field. The progress of international negotiations over Iran's nuclear programme will have a critical impact on the further development of this technology in the region.

FOSTERING REGIONAL COOPERATION FOR SUPPLY AND DEMAND MANAGEMENT

Increasing regional grids and transmission lines, such as the regional electricity network connecting eight countries in the Mashreq could help countries to better manage peak demands and manage distribution shortfalls as energy demand continues to grow. However, such regional options must overcome transmission constraints and depend on surplus generating capacity in the connected countries. Similarly, in the renewable sector, countries could benefit from economies of scale at the regional level to spur necessary investments. The World Bank's MENA Concentrated Solar Power (CSP) Initiative is an example of a regional approach to support the deployment of renewable technologies, enhance transmission infrastructure across the region and support energy diversification and regional integration.

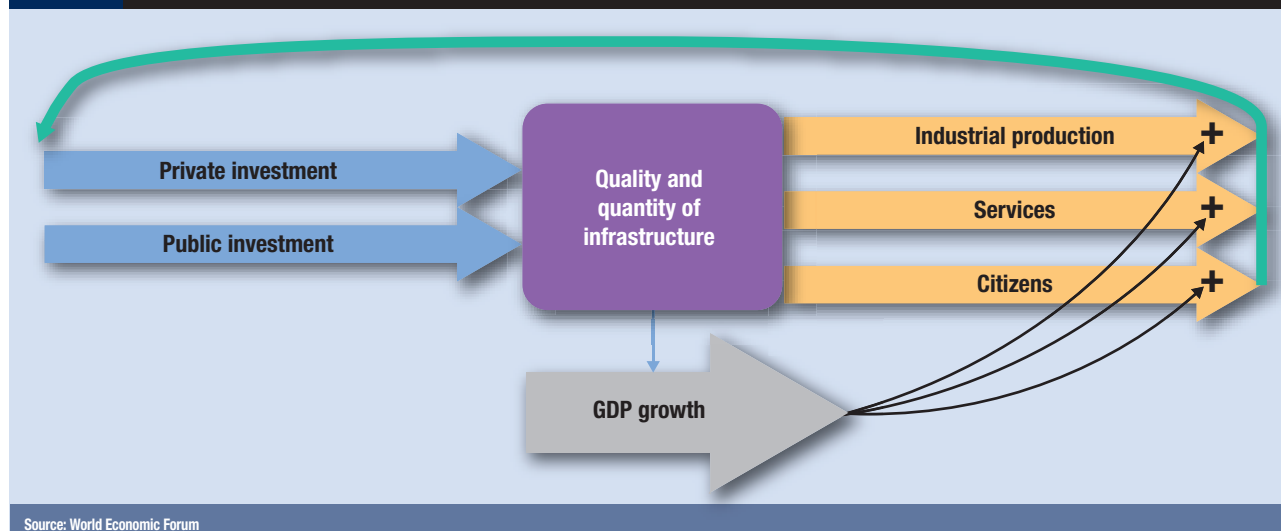
Underinvestment in infrastructure

RISK DESCRIPTION AND IMPACTS

The failure to adequately invest in and upgrade infrastructure severely hinders growth and development in multiple economies around the world. As the previous sections highlight, the MENA region is no exception. Both “hard” infrastructure (including power and energy, roads, rail, airports, water and sanitation systems as well as telecoms) and “soft” infrastructure (the institutions that provide similar support in terms of laws, regulations, exchange systems and basic health, education and emergency services) impact economic growth as enablers of, or drags on, economic activity and by contributing to the risk of acute failures to essential services.

Both quality and quantity of infrastructure are determined by investment from public and private sources. GDP growth is an enabler and user of infrastructure in terms of determining the amount of available capital and depleting infrastructure for productive processes and use by populations. In turn, both the physical stock of infrastructure and its quality are determinants of its contribution to GDP growth (see Figure 6).

Figure 6 Key Input, Output and Influencing Factors in Infrastructure



Direct impacts of underinvestment in infrastructure

- Economic loss because of increased transaction costs for private and public sectors
- Lower quality of life
- Acute failure of critical services
- Environmental degradation (through erosion and increased emissions)

Indirect impacts of underinvestment in infrastructure

- Economic cost of maintaining poor infrastructure
- Second-order economic costs
- Negative impact on resilience to other global risks (particularly water and energy)
- Social tensions

MAJOR TRENDS AND UNCERTAINTIES

CURRENT STATE: A REGION EXPOSED TO “CHRONIC” FORMS OF INFRASTRUCTURE RISK

Over the last 30 years, the MENA region has built a solid basis of essential infrastructure networks; the World Bank reports that the connection rate to the electricity grid by households is in the region of 90%, while access to acceptable water and sanitation services is over 70%. In terms of telecoms infrastructure, the penetration of mobile telephony has, with a few exceptions, reached the level witnessed in industrialized countries. Paved roads now represent between 60 to 70% of the total road network.

However, this base capacity is failing to meet the needs of a rapidly growing region. As discussed in the previous section, there is a 20% shortfall in installed electricity capacity across the MENA region. There is a similar shortfall in road capacity: it is estimated that the total economic and social cost of congestion for the region is about 5% of GDP. Such trends are, in part, signs of the economic success of the region including rising populations, rapid urbanization and a shift in economic structure towards a more industrialized, resource-intense model of growth.

There is also significant regional disparity. GCC governments have invested heavily in infrastructure over the past decade – estimated at US\$ 720 billion between 2002 and 2008. Even though this has been considered as being too little in light of current growth rates, the GCC is relatively well placed compared to other parts of the MENA region; in the Maghreb, deficient infrastructure presents an acute limit to growth.

Furthermore, infrastructure in the MENA region, as in most countries, is often heavily biased towards urban centres. This creates additional risk factors, as it further skews income distribution away from rural areas and could contribute towards urbanization, further stressing existing infrastructure systems and eroding their effectiveness as well as ultimately giving rise to social tensions. In the case of sanitation, a combination of poorly distributed and overburdened infrastructure can go beyond economic inequality and create serious health risks.

VOLATILE INVESTMENT FLOWS HINDER INFRASTRUCTURE UPGRADES AND GROWTH

Underinvestment in built infrastructure is an increasingly important limiting factor for economic growth across the region, particularly outside of the GCC countries. The 2009 Middle East and North Africa (MENA) Regional Conference on Infrastructure Reform and Regulation concluded that non-GCC MENA countries will need to invest more than 9% of their yearly GDP for the next five years in new projects and ongoing maintenance to sustain their economic growth prospects. The conference concluded that to date only half of the estimated requirements of US\$ 75 to 100 billion a year is mobilized by middle-income countries across the region. Flows of foreign capital, which could help fill this gap, have been volatile since 2007, with total foreign direct investment inflows to the region declining 25% between 2008 and 2009 according to UNCTAD's *World Investment Report 2010*. Intra-regional investment also suffered, with capital flows from the GCC to North Africa hampered by the instability caused by the global financial crisis. While the economic outlook is cautiously optimistic, indicating a rebounding of capital flows, there is still significant uncertainty regarding the medium-term economic outlook, which could continue to limit the availability of capital for infrastructure investment in the region.

To complicate matters, investment flows are influenced by, as well as influencing, physical infrastructure: therefore, continuing deficiencies in hard infrastructure have the potential to create negative, reinforcing loops that further limit economic growth. In addition, foreign investors are particularly sensitive to soft infrastructure, as discussed below. It is therefore critical for regional governments to be aware of the limiting and enabling factors represented by hard and soft infrastructure in relation to foreign investment and economic growth.

LEGAL AND REGULATORY FRAMEWORKS LIMIT GROWTH AND INVESTMENT



“The infrastructure risks in the MENA region are not just limited to roads, bridges, airports and ports but comprise a huge challenge in education and the regulatory environment.”

Mohammed Alshaya

Executive Chairman, Alshaya Group, Kuwait

Inadequacies in soft infrastructure in the form of legal and regulatory frameworks form another set of chronic risks to the region. There is a direct link between legal and regulatory frameworks and infrastructure investment flows.

The World Economic Forum’s *Global Competitiveness Report*, for example, cites “the burden of regulation” as a key element affecting infrastructure in two key ways. First, legal and regulatory frameworks enhance the efficiency of infrastructure use by discouraging misuse and overburdening of the built environment (e.g. in the form of properly costed pricing mechanisms). Second, by reducing uncertainty, legal and regulatory frameworks are essential for all forms of private investment, particularly foreign capital involved in infrastructure-focused projects.

As such, mis-specified regulations and other public sector restrictions can crowd out private capital flows, result in lower quality outputs and lead to misuse of infrastructure that greatly reduces its contribution to economic and social development.

A LACK OF REGIONAL INTEGRATION IN INFRASTRUCTURE

Finally, as noted previously, there is a lack of regionally focused infrastructure, both hard and soft. Data shows that despite efforts at regional integration, infrastructure in the MENA region is regionally fractured by being either focused on domestic needs or, in the case of the GCC, on links to global supply chains. The movement of goods and people are relatively constrained between many MENA countries, with a number of completely closed borders creating both economic and political fragility. Further, regulatory inconsistencies create complexity for foreign investors seeking economies of scale and/or diversification in the region.

In general, the MENA region’s lack of regionally integrated infrastructure and supporting institutions restricts investment and beneficial trade flows and sacrifices opportunities to capitalize on resource-sharing that could dramatically increase efficiency and thereby alleviate some of the chronic risks highlighted in the other sections of this report.

LEVERS AND TRADE-OFFS

IMPROVING THE QUANTITY AND QUALITY OF INFRASTRUCTURE THROUGH FOREIGN CAPITAL

Public-private partnerships (PPPs) are important sources of capital for infrastructure in the MENA region. But, just as importantly, private sector participation in infrastructure can provide advanced technologies, know-how and operational processes that maximize efficiency and thus improve the quality as well as the quantity of new infrastructure. Numerous efforts are underway in the MENA region to improve the quantity and quality of PPP projects.

Critical for PPPs, however, is the link to regulatory and legal frameworks as outlined above. Forum interviews highlighted that further improvements in the rule of law, both in practice and perception, and particularly in the ability of foreign investors to feel sure that any dispute with government co-parties can be resolved transparently under a reliable judicial system, are required for investors to feel comfortable about engaging in PPPs. The Forum's recent report *Paving the Way: Maximizing the Value of Private Finance in Infrastructure* argues that budgetary issues and increasingly constrained opportunities will act to steer investment flows to economies that have increasingly stable political, legal and economic regimes. The Forum's *Positive Infrastructure: A Framework for Revitalizing the Global Economy* provides a framework that reflects the key enablers of economic, social and environmental sustainability of infrastructure projects.

However, interviews with corporate leaders suggest that a regional focus on PPP-specific frameworks may be a diversion from more efficient policy improvements that act across the domestic economy as a whole. Where PPP frameworks are attempts to correct, in specific contexts, market failures that are created by inadequate regulatory and legal regimes in the broader business environment, it would be more beneficial for governments to invest in governance reforms that would support increased private sector engagement across the entire economy rather than expending efforts on a series of special cases.

REGIONALLY FOCUSED INFRASTRUCTURE

At a meeting in Jordan in December 2009 on Infrastructure Reform and Regulation, Paul Nounba Um, Lead Economist, Sustainable Development Department of the MENA Region at the World Bank, promoted the establishment of "an integrated regional multi-sector regulatory platform... [to disseminate] international experiences and best practices and enabling peer-to peer-learning and information-sharing for better and affordable infrastructure services in MENA." Um's comment reflects the synthesis of two key concepts – the importance of soft infrastructure and the importance of regionally focused investments.

While the difficulties of achieving such a goal should not be underestimated, such discussions represent a potentially useful route for improving the resilience of infrastructure in the region by enabling infrastructure investments through integrated networks as well as knowledge-sharing and regulatory harmonization. Further, a number of Forum interviewees expressed the opinion that regional collaboration on infrastructure initiatives could also be a catalysing factor in alleviating regional tensions that threaten both geopolitical and social stability.

In addition, both within and between countries in the region, infrastructure investments that directly benefit the rural poor (such as improved transport, sanitation, electricity and water distribution) are also potential levers for alleviating a number of interconnected risks including other health risks, social disruption and second-order economic impacts created by the pressures of urbanization. Further, the Forum reports mentioned above both stress that successful infrastructure projects need to be socially inclusive.

LINKING INFRASTRUCTURE INVESTMENTS TO WATER AND ENERGY RISKS

Previous sections emphasized the importance of infrastructure for water scarcity and energy security, and the influence of incentive systems in these areas on infrastructure investments. Integrated planning and forward-looking infrastructure development could therefore go a long way towards reducing the power of negative feedback loops created by risk interconnectedness. Improvements in water and energy efficiency as well as more sustainable extraction and production practices will have a direct and positive effect on overall risk resilience. As discussed above, improved resilience enables higher rates of economic growth and thereby the amount of capital available for future infrastructure investments.

Conclusion

The complexity, scale and interconnectedness of global risks in the MENA region, in particular water scarcity, energy security and underinvestment in infrastructure, illustrate that all stakeholders must be concerned about effective risk management. This applies at the regional level and also to individual countries and organizations.

While GCC countries are currently less affected by acute and direct impact on growth when compared to the rest of the MENA region, the trends and trade-offs outlined above indicate that all countries face the challenge of managing the chronic, long-term effects of these risks and concurrent threats to regional resilience. In addition, the prospect of acute failures of water and energy systems or essential services remains a major concern for the public and private sectors alike.

While regional governments have a crucial role to play in developing effective responses, particularly through policy interventions that improve capital flows, human capital and infrastructure investments, it is also clear that these challenges cannot be solved by the public sector alone. Private sector participation is critical, not just in providing capital and knowledge, but also through its role in catalysing the social behaviours required to increase resource efficiency.

For the private sector, therefore, three complementary responses emerge from the discussion above. For corporate risk managers, this report hopefully sheds light on the dynamics of global risks that have the potential to impact business operations in the region, providing useful insight on operational risk mitigation.

However, the nature of risk is such that it also presents a range of opportunities. Therefore, for senior executives interested in business and strategy development, this report can also be seen as foreshadowing a range of beneficial investments that markets and populations will demand to alleviate the acute and chronic challenges increasingly presented by water, energy and infrastructure risks.

Most importantly, however, for all leaders in the private sector across the region and, indeed, also for their counterparts in government and civil society, we hope that this report might in some small way contribute to shifting priorities further towards the benefits of building regional resilience through increased cross-sector and cross-country collaboration.

SHAPING THE AGENDA

- How can the MENA region sustain its future demands for water, food and energy and what type of infrastructure investment and socio-economic change is required to do so?
- How can MENA countries foster and develop multistakeholder platforms that facilitate discussions and collective action on shared water, energy and infrastructure challenges?

The World Economic Forum is committed to further raise awareness of these common threats, opportunities and choices to develop shared responsibility for action through its Network of Global Agenda Councils, Industry Partnership Initiatives and its Centre for Regional Strategies. If you would like to get involved in any of these initiatives, please check our website for further information.

Annex – Definitions

Global Risks

Global Scope: Risks that affect no less than three world regions on at least two different continents. While these risks may have regional or even local origin, their impact can potentially be felt globally.

Cross-Industry Relevance: Risks that affect three or more industries.

Uncertainty: Uncertainty about how the risk manifests itself within 10 years combined with uncertainty about the magnitude of its impact (assessed in terms of likelihood and severity).

Economic Impact: The risk has the potential to cause economic damage of US\$ 10 billion or more.

Multistakeholder Approach: The complexity of the risk requires a multistakeholder approach for its mitigation. The risks are classified in five domains: economic, geopolitical, environmental, societal and technological risks.

Resilience

We define resilience as the ability of a system to deliver continually its promised benefits despite the impact of external or internally generated risks. Resilient systems are less affected by external risks, less likely to produce internal risks and tend to expand their ability to learn, innovate and adapt to changing conditions.

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