

Climate change, water resources, and the politics of human security in the Middle East and North Africa

Prepared for the Rabat Workshop on Climate Change

Sponsored by the UCSB Project on Climate Change and the Moulay Hicham Foundation

Rabat, Morocco
September 10 and 11, 2011

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In 2009, the U.N. General Assembly released the Report of the General Secretary on climate change and its possible security implications. This report sought to articulate the links between climate change and national security, including human vulnerability or what we refer to as the human security dimensions of climate change. In global discussions over climatic change impacts, it has become increasingly clear that not all states will be affected or able to respond in like manner to the effects of climate change. Rather, as the Stern Review underscored, it will be the “the poorest countries and populations” that will bear the greatest brunt of climate change (2007, vii). In other words, climate impacts will not be equally distributed, and the extent of differing populations’ vulnerability will depend upon a country’s resources and adaptive capacities.

This is particularly true for the countries of the Middle East and North Africa (MENA), where great disparities in wealth have persisted both within societies and between states. Indeed, some of the most arid ecosystems in the world, such as those in the Arabian Peninsula, are home to some of the greatest consumers of both water and energy, thanks to the wealth generated by the export of fossil fuels.

In this short paper, we suggest that climate change impacts on human security in the MENA region are largely conveyed via the water and agricultural sectors, and that is in these sectors where adaptive policies should be focused. We also argue that the existing political economy of these sectors constrains policy choices, and that policymakers should study existing patterns of local and regional adaptation to water pollution and scarcity before following past models devoted to centralized plans and directives.

Water is a critical conveyor

The Intergovernmental Panel on Climate Change (IPCC) report predicts “annual rainfall is likely to decrease in much of Mediterranean Africa and northern Sahara, with the likelihood of a decrease in rainfall increasing as the Mediterranean coast is approached” (IPCC Report, Chapter 11, p. 866).

In prior work, we have distinguished MENA countries by their vulnerability to climate-induced water scarcity (Sowers et al. 2011).

- Those endowed with more significant surface freshwater resources include Egypt, Morocco, Iran, Iraq and Lebanon.
- Those who rely primarily on groundwater include Libya, Jordan, Yemen, Tunisia, Algeria and Syria.

Countries rich in surface water might expect a dramatic reduction in surface flow, especially since global warming will affect precipitation in intake areas of their rivers. For Egypt and Sudan, changes in precipitation patterns over the Ethiopian Highlands are the key for future flow of the Nile River. For Morocco, precipitation over the Atlas Mountain will determine the flow in major rivers to the major agricultural basins in both northern and southern basins of the country.

Resource scarcity is also exacerbated by demographic growth. For Morocco, its average population growth rate between 2005-2010 was 1.2% with 28.4% of population in 2009 between the ages of 0 and 14. In contrast, in Somalia, the average annual population growth rate was 2.3% with 44.9% of the population between 2.3% (UN country data).

In addition to water scarcity, and of more immediate concern regarding freshwater resources is deteriorating water quality. One of the most important climate impacts on the water sector is its effect on human health because of inadequate water supplies and quality. Given the weak institutional capacities of many states in the region, they are unable to adequately extend water infrastructures in the face of water scarcity, pollution, and demographic growth. The insufficient provision of public goods in the water sector shifts the burden of accessing water onto families and individuals that must arrange for private and expensive water deliveries. For example, Egypt's informal urban areas, water and sanitation services are lacking in many areas, and water is obtained through illegal connections, direct use of irrigation or drainage canals, or purchase of water from private suppliers.

Across the region, there is an urban-rural divide in the provision of safe water. Usually water coverage in the capital and selected urban areas is adequate, but smaller cities, towns, and villages, particularly those in remote locations, are often deprived (Zawahri et al. 2011).

Much attention is focused on the impacts of climatic change on conflict. Yet, the reverse causal flow could suggest that conflict can [further] weaken a country's adaptive capacity.

- Rather than thinking of climate change causing or exacerbating conflict, the impacts of prior or ongoing conflicts on weakening state institutions and social capital may well be more salient, which reduce adaptive capacities to many kinds of ecological stress.
- In many MENA countries, national water institutions are so weak that they are unable to prevent societal actors from appropriating water at will. Protracted conflict in countries such as Yemen has further eviscerated its state institutions. The result is that its government officials have been unable to prevent the illegal

drilling of wells in the Sanaa basin to support the cultivation of qat, a plant widely consumed for its narcotic effects (Kasinof 2009).

Many “forced” adaptation measures are underway in response to both water scarcity and problems with water quality. These include adapting state infrastructures in ‘illicit’ ways, forced migration, and others.

- Similar “illegal” digging of wells to what has occurred in Yemen can be found in Egypt, where many *fellahiin* use mobile diesel pumps to access water from the shallow subsurface aquifer of the Nile Delta. Illegal pumping reflects significant problems in state provision of public goods—that is, the reliable provision of good quality irrigation water to agricultural communities.
- Farmers also pump directly from drainage canals, where water is more saline and carries high levels of organic and chemical contaminants. In Libya and much of North Africa, declining aquifer levels in coastal areas are directly attributable to uncontrolled and illegal pumping for agriculture.

Few adaptive measures are in place and those that may be necessary have social and political costs.

Owing to the political economy of the region that has encouraged rampant corruption, bloated bureaucracies, and weakened civil societies, few proactive policies or adaptive measures are in place to mitigate these risks to human security (Sowers et al. 2011). To date policy measures are usually only in response to specific crises where the impacts are highly visible and garner sufficient media attention, such as drought and aquifer depletion, which directly limit water supplies. In most cases, it is only after agricultural output declines or cities are left short of water that water policy reforms have been initiated to address human security concerns.

One of the most significant divides in the region has been those countries that can afford to access or create new sources of water, and those that face grave financial difficulties in trying to do so. This will become increasingly vital as countries are forced to adapt to increased variability in precipitation and temperature. Libya exceeded its renewable freshwater resources some time ago and because of its tremendous wealth generated from its petroleum sector, it could develop its fossil aquifers to meet increasing demands.

Impacts on Agricultural Sector

The water and agricultural sectors in MENA are typically tightly coupled. Thus, adaptation to climate change (both “forced” and planned) will often come first to the agricultural sector.

Agriculture is not only the greatest consumer of water in the MENA region, but also accounts for the largest share of employment in certain countries, accounting for 28 percent of employment in Egypt, 44 percent in Morocco, and 50 percent in Yemen (World Bank 2007, 61).

- It has long been recognized that MENA relies on virtual water, embedded not only in food but also kinds of imports that require water in their production (Allan 1997). Libya exceeded the capacity of their water resources for food self-sufficiency by the 1950s. Egypt ran out of water in the 1970s. The Maghreb countries also face a water deficit.
- In coastal aquifers, the water deficit and drawdown of groundwater can lead to the intensification of seawater intrusion and salinization of wells overlying the salt-fresh water interface that is moving inland. Over-exploitation of the Souss-Messa basin in southwestern Morocco, which produces a large fraction of Morocco's agricultural export, has caused massive intrusion of seawater coupled with man-made contamination (Bouchou et al. 2008), threatening the productivity of the agricultural sector.
- With increasing variability in precipitation and temperature, populations are likely to accelerate migration away from areas most susceptible to climatic impacts, especially in the agricultural sector. In eastern Syria, for example, prolonged drought (2006-2009) without effective interventions has affected approximately 1.3 million people, accelerating migration to urban areas and increasing poverty.
- Increased urbanization and migration will stress dilapidated infrastructure that was not designed for large populations or finances to expand services and further highlight the state's inability to provide public goods.

One of the greatest obstacles to promoting adaptation to climate change is the current political economy of water distribution in the MENA region that has created different beneficiaries unlikely to stand for a reduction in their current water allocation or water subsidies (World Bank 2007). By subsidizing irrigation water for large-scale users, governments have maintained agricultural policies that encourage water-intensive crops.

Demand management through water pricing is problematic because of its welfare affects. Some studies find that the removal of water subsidies in countries such as Morocco could hurt the poor further and increase poverty (World Bank 2007, 84). Because leaders have shied away from costly socio-political solutions, they instead have reverted back to technological solutions to increase supply rather than addressing water quality and equity issues more directly.

Therefore, policymakers should undertake risk management measures for agricultural producers and rural regions threatened by the water-related impacts of climate change. These policies can often be “win-win”, that is ensuring against climatic volatility while improving livelihoods and social welfare. Such policies being experimented with in other developing countries include crop insurance, innovative water-harvesting techniques (rather than focusing the majority of state investment on large-scale dams), demand-side measures (such as shifting incentives away from some water-intensive crops), recognizing and working with informal systems of water provision, micro-financing, diversification of crops and source of livelihoods, exploring models of agricultural production that incorporate local food security and local markets, etc.

How do some of these considerations relate to Morocco?

- Approximately 90 percent of freshwater consumption goes to the agricultural sector, and continued expansion of irrigation is planned.
- Due to population growth, it is estimated that in 2030, 35 percent of the population will access to less than 500 m³ per person per year, the threshold for severe water scarcity.
- Water quality is already threatened by rising salinity of coastal aquifers (from untreated wastewater, over extraction, seawater intrusion, etc.)
- In agriculturally important regions of Morocco, conflicts between different kinds of water users and sectors will intensify accordingly—for example, between agricultural and tourism consumption.

So where should resources be focused?

Adaptation is development. That is, policies pursued now to address water pollution and scarcity are critical in terms of adaptation to climate change. These measures include wastewater treatment systems and adequate drainage systems for irrigated agriculture. It also means planning for significant shifts in agricultural production and/or more effective irrigation systems (i.e. reducing use of fertilizers and other sources of nitrogen into water systems, etc.).

Morocco has largely focused on supply-side expansion by constructing large numbers of dams of all sizes to catch rainwater but irrigation expansion and dam construction has already been limited by diminishing precipitation and episodic droughts.

Increased demand for water, and the enactment of command and control measures to limit agricultural withdrawals from the hydraulic agency have prompted the expansion of private wells, as happened elsewhere in the region. Also similar to the rest of MENA, groundwater aquifers are being ‘mined’ faster than rates of natural recharge, as farmers resort to more powerful pumps and deeper wells.

From a political economy perspective, political/economic obstacles to using existing state resources to more adequately safeguard freshwater resources are significant. Consider the following: A 1996 agricultural survey identified 1.5 million farms in Morocco, 71 percent of which had less than 5 hectares, and 81 percent of the total farmers were illiterate (Cherkaoui and Ben Ali 2007). This obviously limits development alternatives for farmers. State policies in the agricultural sector are systematically biased towards large landowners, represented directly in the form of interest groups and indirectly through parties that disproportionately represent rural notables. Recent events in the MENA, which have broadening the role for civil society, may provide unforeseen openings for more innovative adaptive strategies.

References

- Allan, JA. 1997. Virtual water: a long term solution for water short Middle Eastern economies? Occasional Paper 3, School of Oriental and African Studies (SOAS), University of London.
- Bouchaou L, Michelot JL, Vengosh A, Hsissou Y, Qurtobi M, Gaye CB, Bullen TD, Zuppi GM. 2008. Application of multiple isotopic and geochemical tracers for investigation of recharge, salinization, and residence time of water in the Souss-Massa aquifer, Southwest of Morocco. *Journal of Hydrology* 352:267–287.
- Cherkaoui, M. and D. Ben Ali. 2007. The political economy of growth in Morocco. *The Quarterly Review of Economics and Finance* 46 (2007) 741–761.
- IPCC. 2007. Climate change 2007: the physical science basis. In: Solomon S, Qin D, Manning M, Chen Z, Marquis M, Averyt KB, Tignor M, Miller HL (eds) Contribution of working group I to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge and New York.
- Kasinof, L. 2009. At heart of Yemen's conflicts: water crisis. *Christian Science Monitor*, 5 November, p 6.
- Sowers, J., A. Vengosh and E. Weinthal. 2011. Climate Change, Water Resources, and the Politics of Adaptation in the Middle East and North Africa. *Climatic Change* 104 (3-4): 599-627. On-line April 23, 2010.
- Stern, N. 2007. Stern review: the economics of climate change. http://www.hm-treasury.gov.uk/stern_review_report.htm.
- World Bank, 2007. Making the most of scarcity: accountability for better water management results in the Middle East and North Africa. World Bank, Washington, DC.
- Zawahri, N., J. Sowers and E. Weinthal. 2011. The Politics of Assessment: Water and Sanitation MDGs in the Middle East. *Development & Change* 42(5): 1153–1178.