

## Water Demand Management and the *water-food-climate* nexus in the MENA region

### POLICY BRIEF 7 <sup>1</sup>

*Climate risks are expected to compound the pressure sustained by water resource and food production systems throughout the Middle East and North Africa. The negative consequences of this water-food-climate interaction can to an extent be buffered by Water Demand Management, and specific WDM interventions are particularly well-suited for increasing the robustness of all three elements. This brief recommends the immediate uptake of these ‘best-fit’ WDM intervention types, and discusses other policy considerations relevant to the water-food-climate nexus.*

“This policy brief is based on an extensive collaborative research effort between the International Development Research Centre (IDRC), International Fund for Agricultural Development (IFAD) and the Canadian International development Agency (CIDA).”

#### **The water-food-climate nexus**

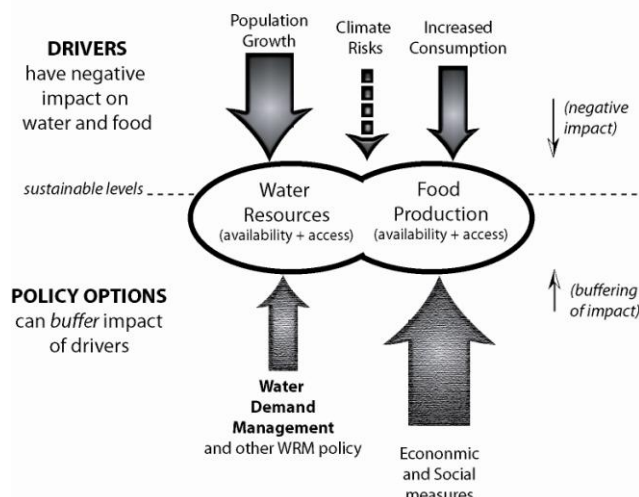
Water resources and food growing conditions are intimately related to the climate. Water use and food consumption have demonstrable effects on the carbon cycle, and the impact that climate change may have on water resource availability and on food growing conditions is substantial in the long term. As most countries in the Middle East and North Africa (MENA) region<sup>2</sup> currently rely heavily on food imports, and abstract water near or beyond sustainable levels, the additional pressure from changes in climate poses a serious threat to both individual and national long-term water and food security.

Water Demand Management is an option from the water sector that policy-makers may deploy as a ‘buffer’ to respond to the pressure (along with the more immediate pressures from population growth and increased consumption levels), as shown below.

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<sup>1</sup> Please refer to the related report Water Demand Management and the water-food-climate nexus in the MENA region, accessible at [www.idrc.wadimena/ca](http://www.idrc.wadimena/ca)

<sup>2</sup> The countries covered in the original report and in this brief include Morocco, Algeria, Tunisia, Egypt, Syria, Lebanon, Jordan, the Occupied Palestinian Territory, and Yemen.



### Water, food and climate risks in the MENA region

Drought is generally held to be the most significant climate risk in the region, especially in terms of impact on livelihoods. Projected temperature increases for the region are for 0.5 to 1.5°C for the period 2020-2029, and 2.5 to 5.5°C from 2029 until the end of the century (IPCC 2007). Decreases in precipitation in the order of 15 to 20% have been projected for the next fifty years, and surface water run-off is projected to drop by 10 to 30% throughout most of the MENA region by 2050 (Milly, Dunne and Vecchia 2005).

With roughly 80% of water in the region consumed by crops (FAO 2009), the effects of climate change are likely to be felt first and foremost in the agricultural sector. Sustained long-term drying can lead to a reduction in arable land, and higher temperatures may lead to increased evapotranspiration (tempered by increased humidity and CO<sub>2</sub> levels). The projected reduction in yields throughout the MENA region is thus even higher than the global average – about 33% in rice, 7% in wheat, 8% in Maize and 4% in millet (Nelson, et al. 2009: Table 3).

The trends should not be over-generalised, however. More localised climate risks include altered rainy seasons, sea level rise and increases in extreme weather events. And water and food management systems across the region are vulnerable to varying degrees.<sup>3</sup> General circulation models project a 15% decrease in non-useable flows in Lebanon (see Bou-Zeid and El-Fadel 2002), for example, but there is clear disagreement whether Nile flows will increase or decrease (Conway 2005). To respond to the challenges in highly uncertain circumstances, policy-makers are best to follow a ‘bottom-up’ approach linking local reality and challenges to global climate concerns, rather than ‘backcasting’ from a wide range of future climate scenarios (see Dessai and Hulme 2004).

Options currently available to policy-makers are rather limited, however. National food self-sufficiency is not viable for most MENA countries, as domestic production and needs cannot be matched. The gap is met by food imports, such that national food security relies to a

<sup>3</sup> Large scale analysis tends to obscure local priorities. Saline intrusion in Gaza and other coastal areas is a much greater risk to livelihoods than is drought (UNDP-PEQA 2009), for example. Similarly, sea-level rise is of much greater concern to Nile Delta farmers (El-Raey 2009) than it is to upper Egyptian farmers.

large extent on international trade. The regional self-sufficiency ratio for cereals has remained from 1990 to 2004 at about 60%, and for pulses the ratio has decreased from 80% to under 60% (IFAD 2009: Fig 1.1). Projections for consumption of cereals and meat point to yet greater dependence on imported food, not to mention the 'virtual water' embedded therein. MENA countries have little option but to push for secure food trade arrangements, as well as for other elements of Water Demand Management.

### **'Best-fit' WDM interventions**

The principles of WDM have been formally taken up into national water policy in Egypt, Jordan, Syria and Yemen, though even there, implementation lags seriously behind. Over forty specific WDM interventions have been tested for significance, in order to improve the record. Twelve WDM interventions were identified as 'best-fit' for being the most broadly relevant to improving both availability and access to water / food, and to buffering the effects of anticipated climate risks. These were classed into five categories: Food trade; Changing consumption patterns; Environmental; Agronomic; and International Cooperation – a sample of which is presented following.

#### *Multi-lateral or bi-lateral trade agreements*

Methods by which MENA countries may reduce their exposure to food market volatility include the improvement of procurement systems, the use of formal risk markets to insure transactions and improved monitoring systems to anticipate price shocks (IFAD 2009). Security against future uncertainties is also improved through diversification of trading partners – e.g. through enhanced political and trading relations with Central Asia, Turkey or sub-Saharan Africa, or through increased trade within the MENA region.

#### *Innovative food and 'green' water trade arrangements*

Favoured terms of food trade can also address water concerns. Food produced through rainfed agriculture ('green' water) may serve to reduce regional water deficits, while irrigated crops ('blue' water) may perpetuate them. Pricing signals that encourage the former and discourage the latter can thus form an important part of an integrated water-food-climate policy (see e.g. ISRIC 2008). Coordination with ministries of trade and finance thus becomes critical for coherent water and food policy.

#### *Food production and consumption patterns ('food demand management')*

Managing food consumption may be the most robust of all WDM interventions, for directly reducing dependence on both food and water systems – domestically and internationally. Public awareness campaigns targeting obesity (see e.g. Brichieri-Colombi 2003) or water-intensive diets (e.g. primarily vegetarian as opposed to meat-based) are likely to be more effective if implemented over a long-term. Study of the savings to be had throughout the entire water/food production system – from 'field to fork' (see e.g. Lundqvist et al. (2008)) – will also help in this regard.

#### *Effective watershed management*

Ecologically-based watershed management may serve to counter some of the difficulties with implementation of Integrated Water Resources Management (IWRM). Context-specific variations of IWRM – such as 'Sustainable water resources management' (Hepworth 2009) –

have been identified to increase resilience under all potential future scenarios, through shifts toward more locally-relevant, sustainable and cohesive institutional structures.

#### *International cooperation*

International cooperation over transboundary water resources is integral to water-food-climate policy in MENA. Basin-wide approaches will be much more effective than isolated national efforts in responding to regional or globally-driven droughts. The development of transboundary management regimes or institutions and standards will help level the playing field. The relatively strong support for International Water Law in the region (6 of the 9 MENA countries have signed the 1997 UN Watercourses Convention<sup>4</sup> – a much greater percentage than any other region) can in theory serve to counter the current unfair water-sharing arrangements, for instance.

#### **Policy considerations and recommendations**

*Integrated water-food-climate policy is key* to addressing the interdependence of the three systems. Policy that serves to address only one of the three can have unintended negative impacts on the others (such as desalination plants reliant on the burning of fossil fuels). Isolated policy is both ineffective and unnecessary: the ‘best fit’ water and food demand management options available are beneficial to the entire nexus.

*A water demand management approach is well-suited for water, food and climate policy.* The temporary food/water security that a supply-side paradigm may ensure in one country is likely to come at the cost of food and water insecurity in another country (or at a later date, in the same country). Policies aimed at reducing or managing water demand are found to be very beneficial for all MENA countries, and pressing in particular for Yemen, Jordan and Egypt.

*Challenges in the political economy oblige a sustained strategic approach.* Direct implementation of WDM or food management policy is typically not a politically feasible option. Policy makers must consider how best to address the interests vested in the status quo, and take a strategic approach to application. A long-term approach to water-food-climate concerns would address institutional reform, markets and consumer behaviour, and redress of power asymmetry, to name only a few. The approach would necessarily rely upon increased transparency, accountability and the involvement of the public in decision-making.

*The most relevant ‘best-fit’ WDM interventions should be incorporated into water, food and climate policy without further delay.* The five WDM interventions discussed here (and several others discussed in detail in the report) found to be relevant to all three elements of the water-food-climate nexus are ‘best fits’ for a range of national policies. MENA countries are strongly advised to prioritise such interventions (and the general approach) when devising their national climate change adaptation plans, and national water and food policy.

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<sup>4</sup> Jordan, Syria, Lebanon and Tunisia have ratified the 1997 UN Convention, while Yemen has signed it. The Palestinian Authority has indicated their intention to ratify the Convention upon entering the United Nations as a full member.

To access the full paper from which this policy brief was derived, kindly visit:  
[www.idrc.ca/wadimena](http://www.idrc.ca/wadimena)

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