

No carrots, no sticks? Limits to the implementation of regulatory tools to control and manage groundwater over-abstraction in the Arab world

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This paper examines the diversity and implementation of different policy and regulatory tools used in countries in the south of the Mediterranean (Middle East and North Africa) to curb groundwater over-abstraction. This is a vexing phenomenon in the region and exercising control over it is a clear challenge to policy-makers, managers, and academics alike, especially given the spatially dispersed nature of access points. There are both limited success stories and a very large diversity of physical, legal, and institutional/cultural contexts, making it difficult to draw lessons and comparisons in order to derive recommendations across the board. Yet, this is a relevant and much needed exercise due to the pressure exercised over the resource and the rate at which groundwater resources are being depleted in these countries. Developing new knowledge and an understanding of the different policy options and the conditions in which these options might be feasible and successful can help decision-makers as they try to tackle these complex issues.

The paper reviews the laws, regulations, community-based actions, and institutional structures put in place in countries across the south of the Mediterranean in order to assess the success and limits of these interventions in controlling access, abstraction, and allocation of the resource under varying management and abstraction regimes. By reviewing a typology of wells within a governance continuum shifting between pure state-driven initiatives and community self-management practices, this research focuses on the different policy tools used in these countries to attempt to regulate and control groundwater over-abstraction: the use of 1) *carrots* to entice users to abstract less; 2) *sticks* to forcibly prevent abstraction; 3) *sermons* to convince farmers to abstract less; and 4) seemingly neutral *technology solutions*. By examining the use of these types of tools, this paper aims to understand the reasons why these different regulatory tools have not been purposively enforced and the limits and challenges for their enforcement.