Non-conventional water resources research in climate change hotspot Middle East

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Rapid population growth, climate change, poor implementation of regulatory frameworks and challenging political relations have led to over-exploitation of conventional water resources in the Middle East. Regional climate model simulations have reported a 10% decline in precipitation across the region by both the middle and the end of this century. Non-conventional water resources, including desalination, wastewater reuse, rainwater harvesting and long-distance water transfer are playing an increasingly important role in the water supply of the countries in the region. This paper aims to assess the extent and impact of non-conventional water resources research in the Middle East and identify original research findings. Cyprus, Egypt, Israel, Lebanon, the Palestinian Territories, Sudan, Syria and Turkey were selected for this purpose. A systematic online library search of the scientific literature was conducted and relations between national indicators and the number of articles and citations were assessed. There is an increasing trend in the number of articles published each year for all non-conventional water resources. Desalination was the most popular research topic (45%), followed by wastewater reuse (39%). The desalination articles covered almost all countries and disciplines, but had, on average, the lowest number of citations (5.4) among the four resources. Publication of desalination articles peaked in 2001, and one third of these articles were authored by private companies. Wastewater reuse articles had on average the highest number of citations (11.5). Most of the water harvesting research was conducted by Israel (62%), while most of the water transfer articles concentrated on Turkey (46%). Diversifying water resources can provide an important contribution to climate change adaptation in the water-stressed countries of the Middle East.