Non-conventional water resources research in semi-arid countries of the Middle East

H. Djuma*, A. Bruggeman, M. Eliades, M.A. Lange

Energy, Environment and Water Research Center, Cyprus Institute, 2121 Aglantza, Nicosia, Cyprus, Tel. +357 22208686; Fax: +357 22208625; email: h.djuma@cyi.ac.cy (H. Djuma)

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ABSTRACT

Rapid population growth, climate impediments, poor implementation of regulatory frameworks, and challenging political relations have led to over-exploitation of conventional water resources in the Middle East. This situation may have impelled out-of-the-box thinking and advances in research on non-conventional water resources including desalination, wastewater reuse, rainwater harvesting, and long-distance water transfer. This paper aims to assess the extent of research on non-conventional water resources in the Middle East, and identify original and innovative 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 was an increasing trend in the number of articles addressing non-conventional water resources. Desalination was the most popular research topic (44%; 5.4 citations, on average), followed by wastewater reuse (37%; 11.5 citations, on average). Publication of desalination articles has increased significantly since 2001, with a substantial number authored by private companies. Non-conventional approaches include commercial salt production at a desalination plant, the strengthening of wastewater reuse standards based on the adverse effects of long-term reuse, the application of a water-harvesting plough for large-scale rangeland rehabilitation, and the development of a 78-km long under-sea pipeline for water transfer. Research on off-site effects and environmental impacts was lacking. Investment in research capacity, as an element of social capital, can contribute to water resources diversification and sustainable solutions both for water-stressed and more humid countries.

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*Corresponding author.

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