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Off-grid desalination for irrigation in the Jordan Valley

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ABSTRACT

Groundwater resources in many regions of the world are becoming increasingly depleted and salinized. With many aquifers straddling political boundaries, on-going depletion presents both a flashpoint for conflict and an opportunity for cooperation. A salient example is that of transboundary groundwater resources in the Jordan Valley. These are shared among Israeli, Jordanian and Palestinian residents. Here we describe a collaborative project aiming to develop a desalination system for use by Palestinian farmers in the West Bank. Students have collaborated across borders in a programme of training and research, in which they have constructed desalination prototypes. These are based on a simple but efficient batch-reverse osmosis (RO) technology that incorporates energy recovery and brine recirculation to achieve 70%–76% recovery and specific energy consumption <1.3 kWh/m^3. The technology can be solar powered with minimal PV footprint. Being built almost entirely from off-the-shelf parts, the system is readily implemented with levels of engineering expertise available in many areas of the world. To test and upscale the technology, and to propagate the knowledge about it, it is being trialled at centres in the UK, Israel and soon in Palestine. It is concluded that the project demonstrates a valuable approach in regions facing transboundary groundwater challenges, and that further learning resources should be developed for free access to foster collaboration across borders.

Keywords: Groundwater; Solar PV; Batch-RO; High recovery; Transboundary resources; Regional cooperation

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