

Reviewer 3

This research seeks to improve our understanding of potential sustainable and cost-effective solutions to water scarcity in arid regions, or areas with increasing pressures on water supply due to emergency, drought, or saltwater intrusion. This specific work looked to evaluate the RO membrane performance and energy consumption under the influence of different conditions of applied pressure, salt concentration and temperature. This is not particularly novel, but could inform future development or rollout of small water treatment solutions in water stressed areas.

Introduction

- Line 54-55... sentence starting “With the development of humans... where he now lives...” is poorly translated and needs revision

-The sentence is rephrased as follow :

Population growth and urbanisation are increasing demand for water in industrial and domestic urban areas.

- Line 61. “Indeed, the WHO considers that there is water stress when a human being has less than 1700 m³ of water per year and a shortage when he has less than 1,000 m³ per year” – This statement should include a reference to the WHO recommendation and it should be revised to make it clear that this is a definition of regional per capita water stress – for all water needs in a community. As written in implies an individual requires this quantity for personal use. As we know, even in “water rich” areas, personal use is in the region of 180-200 litres per day for consumption, cooking, washing, flushing toilets. Much of the water consumed by society is for non-personal use including agriculture, industry, healthcare, commercial services, etc. This needs to be made clearer that there are societal needs and personal needs for water.

- The paragraph is reformulated and references are added:

By definition, a region is considered to be under water supply stress when annual water supplies fall below 1,700 m³ per capita. A region faces to water scarcity if water supply drops below 1000 m³ per capita per year [1]. There are societal needs and personal needs for water. For example, personal use is in the region of 180-200 litres per day for consumption, cooking, washing, flushing toilets. Much of the water consumed by society is for non-personal use including agriculture, industry, healthcare, commercial services, etc.

-The following reference is added:

[1] United Nations. Food and Agriculture Organization (FAO). 2012. Coping with Water Scarcity: An Action Framework for Agriculture and Food Security, FAO Water Report 38 (Rome: 2012).

-Citation [1] used on line 64, and line 71 is incorrectly attributed – e.g., this reference is from 2003 but refers to how things were in 2015 (wrong reference used). Citation [2] is incorrectly attributed on line 65 - out of date, and does not include an estimate to 2050 as stated – a more recent reference should be used. Also the author in the hyperlinked reports is not “Sandia

-The following sentences including wrong references [1] and [2] are deleted from the text:

“In 2015, 600 million people did not have access to clean drinking water [1]. In 2050, an estimated 2.5 billion people will suffer from water scarcity due to changing demographics and increased water consumption [2]”.

The reference [2] is changed by the following one:

[3] Nafiseh Aghababaei Reverse osmosis design with IMS design software to produce drinking water in Bandar Abbas, Iran. Journal of Applied Research in Water and Wastewater 7(2017) 314-318

-Line 68 – first use of MENA should include definition of the acronym

- The definition of the acronym MENA is added “ Middle East and North Africa MENA”

P 3

Line 104 – this statement does not make sense “By 2030, groundwater resources in the MENA region will be decreasing over time and the water demand is expected to exceed 13 million m³. Therefore, the desalination capacity is expected to increase speedily by around 110 million m³/d”... if demand is only 13 million – how can daily capacity require to be 110 million - please review the wording/units etc.

-The sentence is reformulated as below:

“The MENA region's groundwater resources will decline gradually and there will be a water demand exceeding 13 million m³/d by 2030”.

- The units are corrected.

Referencing numbers are all incorrect; e.g., Line 126 – reference to AM Helal [29] but this is [28] in the reference list. Line 131 reference to Bilal [31] is listed as [30] in reference list etc. ...too many to list all the errors

-All references numbers are revised and corrected in the manuscript.

P4

-Line 157 specific energy consumption ... add brackets around (SEC)

-We added the brackets around (SEC) Specific energy consumption

-Line 159 brackish water reverse osmosis ... add brackets around (BWRO)

-We added the brackets around ((BWRO) brackish water reverse osmosis

-Line 168 They discuss ... remove the word “detail”

- The word “detail” is removed.

-Line 197 ... rate of 100 liters of water per day ... per person?

-100 liters of water per day/person

L189 “Additionally, the plants require regular maintenance and repairs, which can be costly...” and P4 line207-208. The biggest constraints of the desalination system are its energy consumption per cubic meter product and environmental impacts due to discharges of brine in the natural environment” these issues are not later discussed in terms of the findings of this research... There was no economic evaluation of the proposed small-scale system, no comment on whether the system provides a reduction in the maintenance/repairs/operational demands.

-The sentence is corrected (by removing which can be costly):
“Additionally, the plants require regular maintenance and repairs”.

-An economic study of the proposed small-scale system is in progress and will be published soon.

-L216 “water supply is 4.4 million m³/d. The plants currently provide 2,12 million m³/d” 4.4 uses decimal where as 2,12 uses comma separation... prefer to use decimal consistently.

-We used decimal “The plants currently provide 2.12 million m³/d equivalent to 780 million cubic meters of water per year”.

-The introduction is modified.

-Line 326-328 stricken out – should remove text that is not needed.

- The crossed out text is removed from the manuscript.

-Line 338 “Skid” should not be capitalized

- “Skid” is corrected “skid”

-Line 342 8KW/d should be stated in conventional power consumption units kWh instead

- 8KW/d is stated in conventional power consumption units kWh “2kWh.

-Line 344.... “some form of activated carbon”.... State specifically what type of AC filter was used.

-We used a commercial activated carbon, the sentence became as follows:

“then commercial activated carbon was used to remove odors”.

-Line 355 "... high-pressure pump HP.." should read "HP pump"

Is corrected to HP pump.

-Table 4 – it is unnecessary for all physicochemical parameters to be stated to three decimal places, and unlikely that the instrumentation used to analyze each can provide such precision. The instrumentation used to conduct these measurements and sensitivity/accuracy are not stated.

-We removed the third decimal value reported in table 4

-The methods and materials section needs reorganized and some sections removed or placed elsewhere. This applies not just to analytical test results but also to section such as on P. 10 starting at line 421 – this is background information which if the authors find necessary to discuss should either be placed in the introduction (to justify the research) or the discussion (to contribute to interpretation of results and application of the study findings). It is not appropriate in the Methods and Materials section.

-The following paragraph is moved to the introduction section:

"Population growth and economic development around..... sustainable energy is an undeniable renovation in terms of the impact on man and the environment [55]"

-The following paragraph, table 6 and figure 6 are moved to the section "2.2 Design of solar photovoltaic powered desalination pilot"

"Algeria has one of the highest solar fields..... the primary sustainable energy sources used for desalination.

Table 6. Solar potential in Algeria [57].

Regions	Coastal region	Highlands	Sahara
Surface %	04	10	86
Average sunshine duration (Hour / year)	2,650	3,000	3,500
Average direct normal irradiation DNI (KWh/m ² /year)	1,700	1,900	2,650

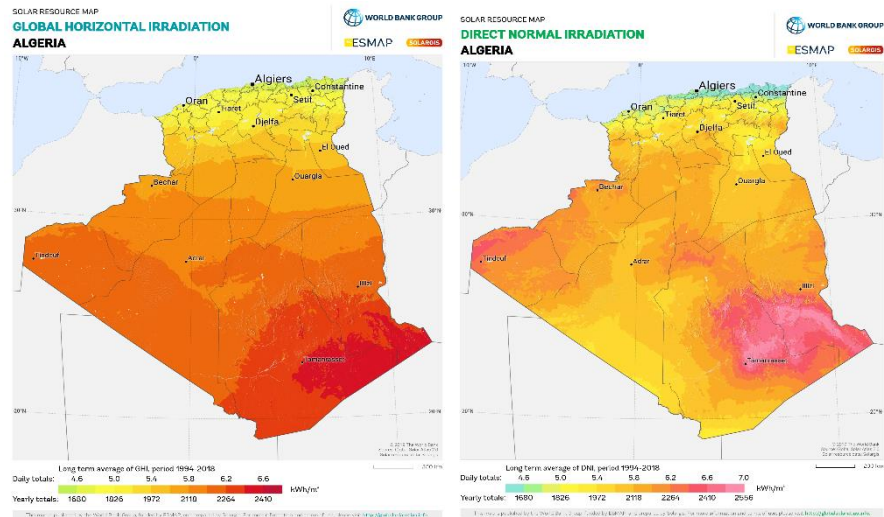


Figure 6. Map of solar irradiation in Algeria [57]