

Author Responses

First of all, the authors (incl. all co-authors) want to thank the referee's for their input and efforts to this article. You definitely made the article stronger and more profound, thank you.

Responds to Referee #1

145 – ln 5-10: There is no reference to the formule. Formule seems to be out of place in this section. *Author proposes to move the formula one paragraph down (after "...during the lifetime of the technology (NWP, 2010)..." and before "The objective of this paper..."). The formula is illustrating what is stated in words by the NWP (2010) in this same paragraph.*

Ln 15: why are these 3 techniques promising for the future? Seems to be quite not objective and a choice by the authors.

Also, Referee #2 said:

Pg 145, line 16, explain why they are "promising for the future"

Pg 145, line 17, efficiency = efficiencies –

Proposed text: "These three systems offer the most optimal combination of (i) accessibility and affordability even for the ultra poor, (ii) most widespread in use in low-income settlements and (iii) a considerable body of literature exists for these three systems.'

146: ln 2 Removal by tortuosity is strange. Tortuosity is a term for a certain ratio, and only defines the length of a path, not the removal mechanism itself. Describe the mechanism instead of the term.

Proposed text: "The ceramic filter is based on the following principle: a porous media of fired clay that retains microbes by size exclusion and high tortuous properties (it traps microbes in the sharp bends) (Hunter, 2009; Sobsey et al., 2008; van der Laan et al., 2014)."

146: Fig 4 is it correct that biosand filter is same size as ceramic filter? In reality these filters are quite a bit higher and larger. Fig 4 suggest they are the same size as ceramic filter, since authors use the same bucket. Change the schematic figure to give a better impression of the size.

Referee #2 says:

Figures: gives references of the schematics (or did you make them your self)

The pictures are made by the authors

148: ln 4: Van der Laan 2013 is not in reference list

Correct. Should be Van der Laan 2014

148: Fig 10: why two times reference to Elliot (2008) in the figure, and why is it not one wide bar? It is only one reference in the reference list of Elliot (2008)

That is correct. Is corrected accordingly.

150 ln 11: "Recent studies" refererering to 2009 and 2010. Doesn't seem to be very

recent.

Proposed change: In the past, numerous studies questioned the effectiveness of HWTS systems. Various field test results indicated that HWTS systems may not always improve and sometimes even worsen the pathogenic state of the influent (Murphy et al., 2010a).

151 – Fig 13: Strange to include subsidies into the price? Is that a fair comparison? Of course this might influence the retail price. but it gives an unwanted comparison in the costs. Strong suggestion to leave out subsidies
Adjusted Fig. 13 accordingly. Proposed alternative: “Overall, no direct relationship between HWTS system’s removal efficiency and economics was observed. This article aimed to be a guide through the currently available HWTS, however, it may be concluded that insufficient reliable information is available for a straightforward recommendation for the most effective and affordable HWTS.

151 – ln 21: Who are K Wagoner, H, Jansen – no reference in ref. list. Why would their personal communication be of value in this article? For the reader it is not clear what their opinion is worth. They could be the neighbor of the authors.
Correct. Their references and titles are added to the reference list.

152 – Section 3.1 is a weak part in this article, with a lot of references to personal communication. It is impossible to check the things stated.

I see your point. Still, of the 5 different references mentioned in this part, 2 are research articles. The authors did an extensive study to collect existing literature both from the field of academy and that of practice. Unfortunately, the reference list reflects reality in this case. Even these relatively well researched methods suffer from a restricted amount of available studies; much of the information only exists in the – often undocumented – field practice.

152 - line 7: ‘Often not included’ > reference? What is often?

Proposed text: However, high variability in both manufacturing and transportation costs translate into a severe limitation in data regarding the relation between costs in logistics and retail price.

152: all the personal communication of "Basic Water Needs" requires at least a specific example. Now it is vague and suggestive.

Proposed text: The first cost-parameter for HWTS systems is the production costs (or investment costs) including, materials (plastic, sand, ceramic), labour and basic tools (Basic Water Needs, personal communication, 2014; K. Wagoner, personal communication, 2014).

Proposed text: Transport costs between production and project area depend on quantity and weight. In-land and over-sea transportation can differ significantly in total cost. For example, getting new ceramic filters to Ethiopia from India is more economic over-sea than over land (Basic Water Needs, personal communication, 2014).

Proposed text: A possible fifth parameter is the (local) distributor’s marginal fee needed to maintain the business. A retailer of (spare parts of) HWTS systems in Ethiopia, for example, can only remain in business if earnings are sufficiently attractive (Basic Water Needs, personal communication, 2014).

152 - line 15: suggestion about if consumers use it more when they have invested for the purchase is irrelevant in this paragraph.

Agreed. Deleted from the text.

153 - Table 1: it would help the understanding and enhance the transparency if Table 1 includes the range of total water production which the price per m³ is based on. Now it is hard to distinguish for reader

Table is adjusted. Where total water production was known, it is added in a new column.

153 - Table 1: influence of subsidies on the calculated price should be mentioned. This is unclear now. What if 50% of all biosand references have received a subsidy?

Proposed text: Retail Price (US\$) without subsidies

153: Fig 14 and 15: Name of Ceramic Filter is missing in figure

Corrected.

155 - last sentence and final conclusion: Wouldn't the authors also conclude that with this clear overview and indication that so many things are unclear and hard to pinpoint, both on effectiveness as on economics, there is a stronger need/surge for reproducible, reliable research, because basically now there is no where to go when somebody wants to draw conclusions on 'what HWTS shall I invest in?'. A suggestion by the authors in their conclusion for the for reliable research, taken both human behavior and practice, and proper scientific research into account, seem to be natural to add – even though this is only quite a 'soft' suggestion and not a strong scientific conclusion

Proposed text: Overall, no direct relationship between HWTS system's removal efficiency and economics was observed. This article aimed to be a guide through the currently available HWTS, however, it may be concluded that insufficient reliable information is available for a straightforward recommendation for the most effective and affordable HWTS.

Responds to Referee #2

Pg 144, line 4, “cost drivers” are not further mentioned in the abstract so delete –

Replaced by economic parameters

Pg 144, line 9, dispersion = distribution (see also elsewhere in document) –

Pg 144, line 9, log removal of what? –

proposed alternative: the findings show a wide distribution of log removals of contaminants in the HWTS systems.

Pg 144, line 10-11, mention what type of bacteria and viruses (pathogenic, indicator?)

Proposed text: For bacteria (E.Coli), log removals of 1–9 (SODIS), 0.5–7.2 (ceramic) and 0–3 (biosand) were reported. In the case of viruses (mostly echovirus and bacteriophages), log removals of 0–4.3 (SODIS), 0.09–2.4 (ceramic) and 0–7 (biosand) were found.

Pg 144, line 12, removal = removals

Done.

Pg 144, line 22, rephrase “are decades away for these people”

Proposed text: Conventional piped water delivery and similar centralized systems are unrealistic/not feasible for rural and peri-urban communities in the near future, implying that they are left with the responsibility (and need) to collect, treat and store their own water (Brown et al., 2008).

Pg 145, line 20, avoid wording like “extremely simple” since this is subjective

Replaced by “straightforward”

Pg 146, line 17, 21, this pathogens = these pathogens

I don't see this error back in my text, will correct it if I do.

Pg 147, line 6, are = were –

done

Pg 147, line 15, what type of bacteria and viruses (see above) –

See above

Pg 147, line 15, lays = lies –

Done

Pg 147, line 21, must be “log removal for bacteria and.. for viruses respectively. –

Corrected accordingly

Pg 148, line 7-8, what is the effect of storage time? –

Proposed text: On the contrary, the storage time in the receptacle of a silver-impregnated filter was found to be an important parameter in the bacterial removal efficiency; lengthy contact time in the receptacle led to higher removal efficiencies (van der Laan et al., 2014).

I propose to place this sentence one line above; after “...did not find a significant difference in removal efficiency for different silver application methods”.

Pg 148, line 11, dispersion = distribution – *Done*

Pg 148, line 15, delete “based on” and put references between brackets. *Done*

Pg 148, line 21, significantly = considerable (you did not do statistics) *Done*
Pg 148, line 25, charged = loaded *Done*
Pg 148, line 26, delete “charge” – *Done*
Pg 148, line 26, must be “equal to and smaller than” – *Done*
Pg 149, line 1, delete “research shows that” *Done*
Pg 149, line 5-7 delete sentence since it does not contribute to discussion *Agreed*.
Pg 149, line 10, virus particles =viruses – *Correct*.
Pg 149, line 11, non-existing = lack of *Done*
Pg 149, line 16, delete “based on” -*Done*.
Pg 149, line 23, delete “research” -*Ok*.
Pg 149, line 23-24, delete sentence, since this is not always true – *Agreed*
Pg 149, line 27, must be “as Murphy et al. (2010) and Van der Laan et al. (2014)”
Done.
Pg 149, line 28, delete “exactly” – *Ok*.
Pg 150, line 1, SODIS is not a filter –
Proposed text: produced with this particular HWTS system.

Pg 150, line 1-2, delete sentence –
The authors want to argue for the keeping of an alternate version of this sentence in the text. The reason being: this sentence is considered to carry a significant notion: analysed data reinforce that obtaining any of these three devices is no measure of guarantee against contaminants.” Proposed alternative to include in text: “This stresses the issue of self-reliance: users of the viewed devices determine themselves the quality of contaminant removal.

Pg 150, line 3, must be “reported log removal” – *Agreed*.
Pg 150, line 4-5, delete sentence – *Done*
Pg 150, line 10, delete heading (can be part of 2.4) -*Agreed*.
Pg 150, line 13, influent = water (you are not changing the influent) – *Agreed*
Pg 150, line 21, delete “research shows” – *Ok*
Pg 150, line 21, must be “can also reduce” – *Agreed*

Pg 151, line 2-9, avoid starting with “people” –
Pg 151, line 2, water supply = water production –
Proposed text: Other reasons why in practice the effectiveness of HWTS systems is reduced: (i) Only part of the used water is treated (Sobsey et al., 2008), as the water production of HWTS systems can be reduced in time due to clogging (ii) replacements-purchases are unfeasible (Brown et al., 2009; Hunter, 2009; Meierhofer and Landolt, 5 2009), (iii) water is only treated intermittently (Sobsey et al., 2008), (iv) limited guidance to determine whether pre-treatment is necessary (Sobsey et al., 2008), (v) Usage of the device is simply stopped (Hunter, 2009),

Pg151, line 22, 5 = five – *Changed accordingly*

Pg 152, line 1-2, delete sentence (does not add to discussion) –
To referee #2: We have a conflict in suggestions from the two referees. Referee #1 requested more examples instead of deleting. Please note that sentence in question is not meant to add to discussion, but to exemplify the regions of production. Our response: we want to leave in sentence ‘as is’.

Pg 152, line 4, significantly = considerably – *Done*
Pg 152, line 24, 5 = five – *OK*.

Pg 153, line 4, choose for USD or EUR in the entire document –
Proposed text: For biosand filters, large ranges are found in the price per m3 and retail price: USD0.06-8.13 and USD7-100 respectively (conversion 1.23EUR/US\$ used where necessary following Bloomberg (2014)).

Pg 153, line 6, must be “by Akvopedia (2013)” – *Agreed*
Pg 153, line 9, must be “prices of around” *Done*
Pg 153, line 19, after = when – *Done*
Pg 153, line 19, outlier = outlier (see also elsewhere in document and figures) – *Done*
Pg 153, line 25, what do you mean with this sentence? (consider deleting) – *Sentence deleted*

Pg 154, line 5-7, delete sentence (or mention this as an example) –
Pg 154, line 7-8, delete “does not only depend on : : .. before, but” –
Pg 154, line 9, must be “rates, the price” –
Proposed text: For example, Resource Development International in Cambodia reveals a standing quotation of a ceramic filter for USD12 (RDI, 2014), which is in line with the prices in other sources. The price of HWTS systems depend on the four parameters mentioned before, but is also fluctuating in time and susceptible to exchange rates. The price of the HWTS system today is therefore different from the price 10 indicated for 2007 (H. Jansen, personal communication, 2014).

Pg 154, line 11-12, delete sentence – *Sentence deleted*

Pg 154, line 14, keep same order as in document –
Proposed text: In this study the removal efficiencies and economics of three selected Household Water Treatment and safe Storage (HWTS) systems were compared:
Pg 154, line 16-23, mention costs after effectiveness – *done*

Figures: gives references of the schematics (or did you make them your self)
Proposed text: Figure 2. Schematic illustration of SODIS (own elaboration)