

## **Response to Reviewer 2**

### **General Comments**

#### **Comment 1**

This aspect is addressed in lines 98 to 113, where different carbon sources are discussed.

#### **Comment 2**

The objective of our research was to evaluate the removal of nitrates in a biosand filter to meet the water quality requirements, and not at various levels or depths. However, this could be a potential area for future research.

#### **Comment 3**

The objective of the study was to evaluate a biosand filter for potable use with regards to nitrates and hence excluded the negative impacts on the aquatic environment like fish.

#### **Comment 4**

We also appreciate this line of research of using fluidized sand biofilters. However, the additional costs associated with pumping to maintain bed expansion or fluidization must also be considered as compared to the conventional biosand filter. Hence, biosand filters are suitable for low income communities, a concept inherent with their use.

### **Specific Comments**

#### **Comment 1**

If we had started with 11mg/l, then we were not going to be able to evaluate the removal rates above the acceptable value for potable use (narrow range). Moreover, most waters of concern have nitrate concentrations above the 11mg/l.

#### **Comment 2**

Dissolved oxygen concentration is influenced by a number of factors including water temperature, organic matter, salinity and atmospheric pressure. The operating temperature of the filters was between 19°C and 20°C (Line: 179) and the measured DO values are typical at such temperatures. Furthermore, the water which was used was raw river water and the DO can range between 0 to 18mg/l in such waters depending on level of pollution.

#### **Comment 3**

This phenomenon is explained in lines 232 to 237. Also other researchers have noted insignificant pH changes in similar filters (Baba et al., 2015). Another reason could be the short resting period of 24hrs because significant changes of pH are noted after 5

days (Rust et al., 2000). Also, a higher concentration of the carbon source can result in an increase in pH.

Furthermore, It should be noted that in a biosand filter, the process is not purely denitrification. There is also nitrification and aerobic respiration at the top due to availability of oxygen and this phenomenon has been explained in lines Lines 30; 32); 75-78; 246-252 and also confirmed by Heather et al. (2010) and Willian et al. (1986). Nitrification is obligatorily coupled to oxygen consumption and has an effect on the decrease in alkalinity. Such a decrease in alkalinity might cause a decrease in pH (Habboub, 2007). Acidic nitrite formation results in a drop in pH, thus if the buffer capacity of the system is weak, the pH might drop well below 6.7

## **Technical corrections**

1. Direction of flow:-Noted
2. Data sets corrected due to typing error