# Optimum Denitrification of Stormwater using a Woodchip Bioreactor

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## Scope

- **Stormwater** is a viable option to replenish groundwater supply
- Before **groundwater recharge** stormwater must be treated of contaminants.
- Contaminants of interest include Nutrients, **Nitrates** in particular
- **Woodchip bioreactors** are successful at removing Nitrates
- **Denitrification** is the mechanism driving Nitrate Removal
- Woodchips leach **Dissolved Organic Carbon** (DOC)
- **Biochar** is pyrolyzed biowaste with a high surface area

## Objectives

① Column Study: *Examine how the Hydraulic Retention Time (HRT)changes the depth profile in terms of DOC, DON and DO concentrations*

② Batch Experiment: *Test if the addition of biochar decreases the amount of DOC leached from a woodchip bioreactor*

③ Geomedia Mixture: *Observe if the addition of biochar to a woodchip bioreactor would enhance denitrification*

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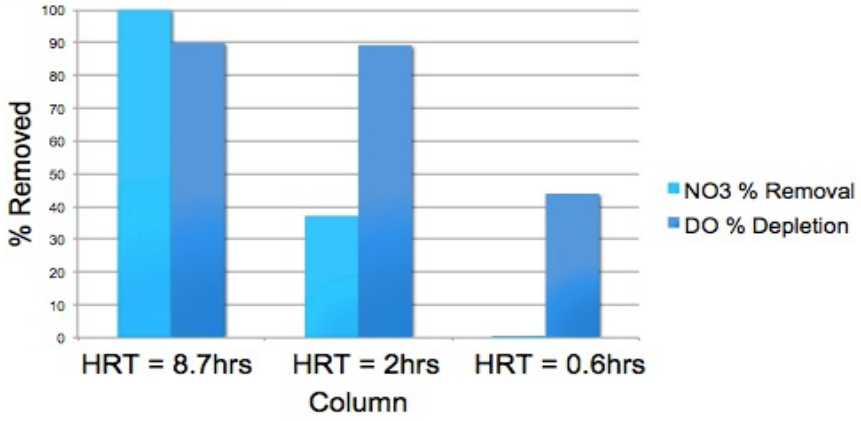
# Results

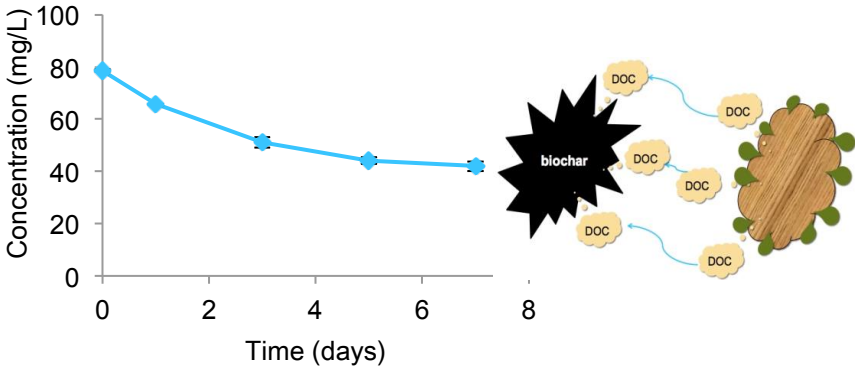
## ① Column Study

**Figure 1:** Dissolved Oxygen Depletion and % Nitrate Removal



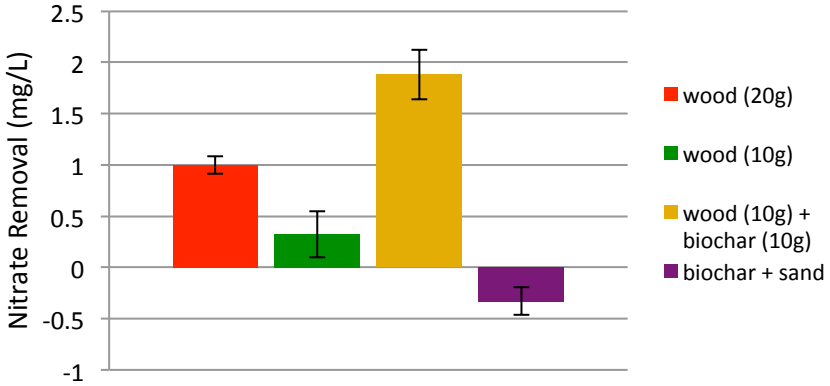

## ② Batch Experiment

**Figure 2:** Leached DOC sorption to Biochar




## ③ Geomedia Mixture

**Figure 3:** Nitrate Removal by Geomedia after 2 weeks




# Major Outcomes

- A longer HRT removes more Nitrates even though a similar anoxic condition is achieved with a shorter HRT **(figure 1)**
- Biochar is able to sorb leached DOC from woodchips, in addition to also enhancing denitrification **(figure 2,3)**

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