

Water quality trade-off considerations for agricultural managed aquifer recharge

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Global dependency on groundwater as a source of freshwater is growing. However, prolonged drought periods exacerbated by climate change are leading to aquifers being critically overdrafted. In California, distributed stormwater collection managed aquifer recharge (DSC-MAR) is a groundwater replenishment method being implemented in the Central Coast region, where groundwater fulfills ~90% of all freshwater needs. During DSC-MAR, stormwater is collected into a basin that then infiltrates into the aquifer below. Because stormwater can contain high nitrate due to basins being installed in agricultural areas, wood chips are added to the basin to enhance denitrification. However, the addition of wood chips promotes reducing conditions, which also lead to the release of geogenic metals. In this presentation, we present our findings thus far on the biogeochemical processes controlling denitrification and metal release in DSC-MAR basins under redox oscillating conditions that simulate the oxic-anoxic cycling induced by seasonal rainfall. We discuss the various trade-offs that need to be considered when implementing managed aquifer recharge on agricultural lands and close with suggestions for future research directions.