Case Study 4D: Integrated Water Management

Enhancing Water Sustainability for Winery Irrigation with Treated Domestic and Internal Wastewater in Napa, California and Valle de Guadalupe, Baja California

Participants

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Introduction

With the uncertainty facing water managers in arid California and Baja California, there is a growing acknowledgement of the need to diversify water sources for crop irrigation. One potential source is recycled water from wastewater treatment plants (WWTP), and a potential user is vineyards (Chen et al. 2013). Initial social concerns surrounding the use of reclaimed water for crop irrigation may have influenced the slow adoption of the practice (Fielding et al. 2017), but increased literature supporting its use has impacted local and government acceptance (Bischel et al. 2012).

The growing acceptance of this practice has sparked the research interest of farmers, engineers, and biologists alike to further understand the long-term effects of soil, water, and crop quality with prolonged irrigation (Chen et al. 2015). There are many benefits to using reclaimed water for irrigation, including soil nutrient recovery, water conservation, and lessening dependence on aquifers as a water source (Toze 2006). Vineyards are generally a less water-intensive crop than other agricultural commodities. Understanding how reclaimed water for vineyard irrigation may potentially benefit wine crops is both important for determining sustainable water management options for Baja California's Valle de Guadalupe, but also serves as a successful project influencing changes in general agricultural water resource management on a larger scale.

Shifting agricultural water resources in times of climatic extremes to more sustainable options can support the long-term local economy and promote similar practices in other regions of Mexico impacted by drought. Understanding how reclaimed water for vineyard irrigation may potentially benefit wine crops is both important for determining sustainable water management options for Baja California's Valle de Guadalupe.

Objectives

- Understand successful water reuse irrigation systems in Napa, CA to adapt for the vineyards in Guadalupe Valley.
- Analyze water regulations in CA and MX, compare for both regions and highlight possible disparities or obstacles in applying water reuse system in MX.

- Analyze institutional constraints at both UC Merced and the University of Baja California, Ensenada for carrying out the project.
- Analyze social constraints impacting implementation at both locations.

Hypothesis/Expected Outcomes

- The case study shows that distribution systems to transport recycled water from the WWTP to end users can be expensive, and that addressing water quality considerations are critical for stakeholder buy into use recycled water at vineyards.

Figures/Tables

Water Type	Parameter	Quality Criteria
Disinfected Tertiary: oxidized, filtered, and disinfected	Total coliform	• Median concentration < 2.2 MPN/100 mL in any 7 days of analyses • < 23 MPN/100 mL in more than one sample in 30 days • < 240 MPN/100 mL at any time
	Turbidity for Filtration Using Natural Undisturbed Soils or a Filter Bed	• Average turbidity < 2 NTU in 24 hours • < 5 NTU more than 5 percent of the time within 24-hour period • < 10 NTU at any time
	Turbidity for Filtration Using Microfiltration, Ultrafiltration, Nanofiltration or Reverse Osmosis	• < 0.2 NTU more than 5 percent of time in 24 hours • < 0.5 NTU at any time
Disinfected Secondary 2.2: oxidized and disinfected	Total coliform	• Median concentration < 2.2 MPN/100 mL using last 7 days of analyses • < 23 MPN/100 mL in more than one sample in 30 days
Disinfected Secondary 2.3: oxidized and disinfected	Total coliform	• Median concentration < 23 MPN/100 mL in any 7 days of analyses • < 240 MPN/100 mL in more than one sample in 30 days
Un-disinfected Secondary: oxidized, not disinfected	None	None

Table 1: Water Quality Standards for Recycled Water Use in California