CV-SALTS PROJECT HIGHLIGHTS

SALT AND NITRATE SOURCES PILOT IMPLEMENTATION STUDY

PROJECT TEAM: LARRY WALKER ASSOCIATES, SYSTECH WATER RESOURCES, INC., LUHDORFF & SCALMANINI CONSULTING ENGINEERS, AND NEWFIELDS AGRICULTURAL AND ENVIRONMENTAL RESOURCES

Salt occurs naturally in most water, and it concentrates when water evaporates or is absorbed by plants, or when salts in rocks, soils, fertilizers, household products, water softeners, and the like dissolve. Naturally occurring and imported salts are applied to land and discharged to surface waters as part of many land and water uses. Correspondingly, the salt mass, unless exported or otherwise removed, accumulates and creates the potential for long-term adverse effects. When salt, or specific constituents of salt, concentrate too much, water can become unsuitable for some beneficial uses. For example, nitrate is a component of salinity that is of increasing concern due to its potential to migrate into groundwater and, at high enough concentration, render it non-potable. It is therefore essential that the sources of salinity and its components be understood and managed to avoid these impacts.

CV-SALTS is a non-profit coalition of stakeholders that aims to organize, facilitate, and fund efforts needed for the efficient management of salinity in the Central Valley. The coalition membership works collaboratively with partners such as the State Water Resources Control Board and the Central Valley Regional Water Quality Control Board.

It is daunting to understand and manage salt and nitrate in large and complex hydrologic systems, comprised of the atmosphere, land surfaces, soils, surface waters, and aquifers. How, for example, is a source of saline water at some point in the watershed related to a point a hundred miles downstream, where water is diverted for drinking or irrigation? How are sources located and quantified? How are the combined and cumulative effects of sources on multiple beneficial uses of water throughout the watershed evaluated? In these evaluations, how is the influence of seasonal and inter-annual variation in climate and hydrology accounted for?

The coalition and its partners recognize that comprehensive analytical tools are needed to improve the management of salinity and other constituents in the Central Valley's surface waters and groundwater basins. Powerful computer-based tools are available to facilitate the compilation and analysis of land use and hydrologic data. CV-SALTS initiated this project to pilot test methods and approaches that will aid analysis of salt and nitrate to guide us in their management.

This project entailed the application of several readily available tools for organizing and analyzing land, surface water, and groundwater data for three large and representative Central Valley watersheds in the Tule River, Modesto, and Yolo County areas. Salt and nitrate sources were comprehensively characterized and mapped. A public domain watershed model, Watershed Analysis Risk Management Framework (WARMF), was applied to simulate movement of salt and nitrate above and beneath the land surface, and to incorporate salt and nitrate source, soil, climatic, hydrologic, and water quality data into the analysis. Watershed model output was then linked to various groundwater models to assess salt and nitrate movement in the underlying aquifer systems and the potential for long-term effects on groundwater quality. The collective watershed and groundwater model results demonstrate and quantify the influence of salt and nitrate mass loading on the land surface, surface water, and groundwater. The prototype methodologies illustrate the types of whole hydrologic system accounting tools that can be used to analyze other watersheds and timeframes, including future land and water uses. The guidelines developed from this study provide the foundation for improved analysis of salt and nitrate movement to support their effective management throughout the Central Valley.

Pullouts: WARMF schematic, source attribution pie chart, land use map.

Logos of four firms across bottom