Use of EM-38 Soil Salinity Surveys to Calibrate a 1-D Transient Model for Decision Support and Sustainable Salinity Management

Nigel W.T. Quinn

werri.lbl.gov

Motivation

Soil salinity is a major factor affecting irrigated agriculture in semi-arid regions world-wide. Re-use of saline-sodic drainage water to irrigate salt-tolerant forage crops reduces the volume of saline DW requiring disposal and it extends the irrigation water supply. Sustainability of forage production requires application of adequate irrigation water to leach salts from the root zone. Decision support is needed to guide these leaching decisions.

Technological Challenges

Agricultural soils are typically heterogeneous – developing sustainable irrigation and salinity management strategies require a combination of advanced survey and monitoring techniques and hydro-salinity models that water managers can understand and apply. Permanent, in-situ sensor networks may in time, allow improvements in salinity management in reuse areas where agricultural drainage is mixed with higher quality supply water to irrigate forage crops.

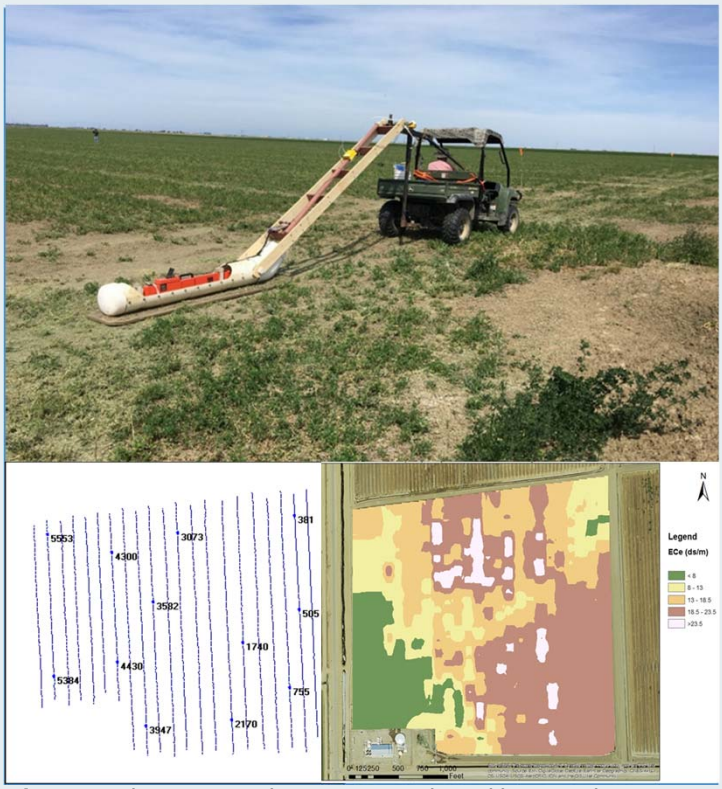

Figure 1. *Electromagnetic surveys conducted in Panoche Water District's agricultural drainage reuse area (SJRIP) to assess root zone soil salinity for alfalfa and Jose tall wheatgrass forage crops.*

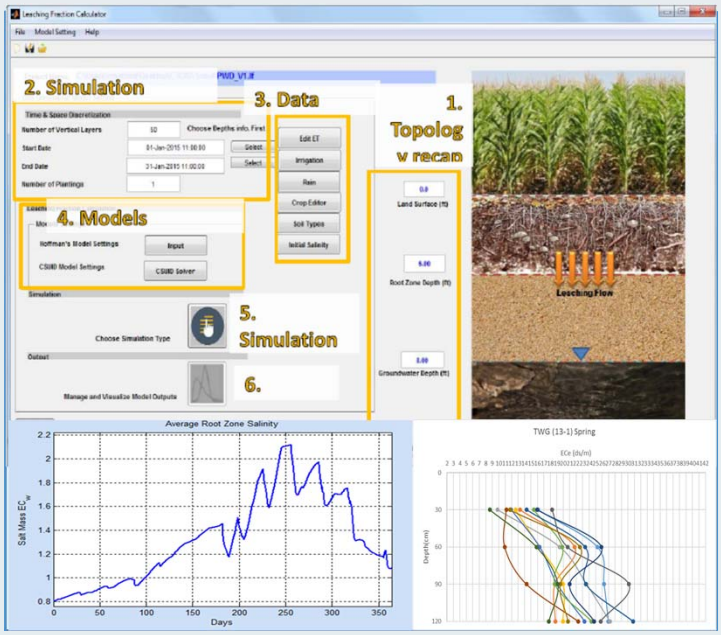

Figure 2. *1-Dimensional hydro-salinity model and user interface to provide decision support to water district managers to improve real-time salinity management and groundwater blending decisions within the SJRIP drainage reuse area.*

Research

Electromagnetic (EM-38 soil salinity surveys were conducted to assess the spatial distribution of salts in selected project fields. Soil, irrigation water and forage production data have been used to calibrate, validate and refine a hydrosalinity simulation model. All fields had lower salinity(Ece) at 0-30 cm depth than higher depths indicating some degree of leaching. Soil salinity is highest at the lower end of each irrigated basin.

References

[1] Quinn, N.W.T., O. El Ghazlane, C. Mathiot, A. Alzraiee, A. Singh, K. Longley and S. Benes 2017. Validation of the Steady-State Hoffman Conceptual Model for Determination of Minimum Crop Leaching Requirements and Stakeholder Outreach Using CSUID. DWR Proposition 204 Project Final Report, Sacramento, CA.

Acknowledgements

The author acknowledges funding from the Department of Water Resources (DWR) Proposition 204. The project received permission and technical assistance from Panoche Water District.