Watershed and Agricultural Resources Management in the Pajaro River Watershed

Elizabeth Eichorn
Applied Marine and Watershed Science Master's Candidate
California State University Monterey Bay

Supervisor:
Chirs Coburn, Executive Director, Resource Conservation District of Santa Cruz County

Academic Advisor:
Fred Watson, Associate Professor, California State University Monterey Bay

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TABLE OF CONTENTS

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EXECUTIVE SUMMARY

As the Watershed and Agricultural Resources Management Intern with the Resource Conservation District of Santa Cruz County (RCD), I contributed to a variety of water and resource conservation projects across Santa Cruz County. The mission of the RCD is to help people in Santa Cruz County protect, conserve, and restore natural resources through information, education, and technical assistance programs. Specifically, the RCD staff fulfills this mission by collaborating extensively with local land owners, land users, and partner agencies, using a non-regulatory approach to assess local resource management issues and provide technical assistance to improve land use practices.

The RCD offers technical assistance with a variety of conservation issues including, but not limited to: on-farm water and fertilizer use efficiency, stormwater pollution prevention, wildfire preparedness, proper livestock management, rural road erosion control assistance, and species recovery and habitat enhancement. As an intern, I assisted with many of these projects but spent the majority of my time helping the agricultural resources conservation team with water and fertilizer use assessments and future project planning.

The data collected during on-farm monitoring events is not complete, as the growing season for strawberries is still underway, and planning is still in process for the major project I contributed to. So, this report will be devoid of concrete results, but will speak to how I helped with on-farm resource use assessments and the preliminary results of the analysis I performed to help determine future project locations.

1 PROJECT OBJECTIVES

1.1 Personal Objective

Currently, I am a master's candidate in Applied Watershed Science at California State University Monterey Bay. My degree requires that I complete a 400 hour internship with an agency of my choosing to have a chance to apply my educational training to pertinent professional work. Therefore, while interning at the RCD, it was my personal objective to not only fulfill my internship requirement but also to gain further experience in understanding local politics and the management strategies underway to address water supply and pollution problems in our local agricultural areas.

This experience allowed me to cultivate relationships with NRCS, RCD, and partner-agency staff and to increase my skillset to include soil monitoring, erosion assessment, and water quality testing. All of which will be of use in a future career with the USDA.

1.2 Irrigation and Fertilizer Assessment Objective

The primary objective of the irrigation and fertilizer assessments performed by the RCD is to provide fruit and vegetable growers with in-depth information about the efficiency of their farming operations and what they can do to improve their practices to increase economic gain and minimize resource waste and water pollution. The RCD staff works with growers throughout the county but focuses their efforts on farms in the Pajaro Valley as that is where the majority of agricultural operations are located.

1.3 Pajaro Watershed Toxicity Analysis Objective

The primary objective of the GIS-based data analysis I performed was to develop a decision support tool to determine where nutrient, pesticide, and sediment loading reduction projects should be implemented to best address pollution and toxicity in the Pajaro River watershed.

2PROJECT APPROACH

2.1 Irrigation and Fertilizer Assessment Approach

Exact methods for assessing irrigation efficiency depend on the type of irrigation system being used, but the same general approach applies. In the Pajaro Valley, the majority of crops grown require either drip irrigation or sprinkler systems. The RCD uses a protocol that measures distribution uniformity of water pressure and quantity across an irrigation block which can then be extrapolated to the whole farm. We place a series of water catchment cups (or buckets for sprinkler systems) at a minimum of four locations across the block and track the cup volumes after ten minutes of irrigation and take pressure readings on the various lines or sprinkler heads throughout the process.

In order to assess available nutrients in the soil on a given planting block, we performed Soil Nitrogen Quick Tests (SNQT). Nitrate contamination of groundwater in the Salinas and Pajaro Valleys is widespread and is the impetus for monitoring soils so that farmers can better gauge when to and when not to fertilize.

To perform a SNQT, a team of two people randomly samples ten or more locations across a planting block with soil core instruments. Samples are taken of the top 12" of soil and then of the 12" below that and kept separate. When all samples have been taken, they are thoroughly mixed in the bucket appropriate for their depth, and soil is added to a pre-prepared solution of calcium chloride. After the solution is shaken vigorously, it sits and the soil settles. A nitrogen test strip is submerged in the clear liquid that rises to the top of the column, and we are able to determine the approximate amount of nitrate in the soil from the color of the strip (much like a pH test). This number is then converted into pounds of nitrogen per acre available to the plants at the two different depths, taking in to consideration the soil type.

2.2 Pajaro Watershed Toxicity Analysis Approach

In addition to monitoring water and fertilizer use, the RCD collaborates with growers to implement on-site conservation practices that minimize farm runoff and water pollution not just to meet regulations but also to be good stewards and to minimize costs. Recently, the RCD, in partnership with UC Davis Granite Canyon Labs, was awarded a grant from the State Water Resources Control Board to address pesticide loading and toxicity in the Pajaro River watershed. The purpose of this project is to reduce pesticide loading and toxicity through the implementation of in-field, edge-of-field, and centralized downstream treatment practices that are proven to reduce pesticide loading.

Currently, RCD staff is in the planning stages of this project, and I was able to help with compiling and processing the necessary geospatial data, using ArcGIS to determine where their efforts should be focused. This task largely entailed downloading and making sense of publically available pesticide use reporting data, toxicity data, and pesticide detection data for the region. We also collaborated with state and local experts to gather their opinion to better inform this process.

3 PROJECT OUTCOMES

3.1 Irrigation and Fertilizer Assessment Outcomes

The irrigation distribution uniformity data is provided to the grower in report form, identifying locations on the block that might be getting over or under watered and offering recommendations for improving the efficiency of the system. Soil nitrogen data is entered in the online UC Cooperative Extension CropManage program along with daily irrigation data, and a report is generated comparing actual fertilizer and water use to modeled, crop-specific ideal

inputs. The grower is then able to see times of the year they may be over or under fertilizing or watering. Combined with their observations of crop success during different parts of the growing season, these reports can be useful tool in increasing crop yield and/or profitability in the years to come. The data I helped collect will be disseminated to growers once the growing season is complete later this fall.

3.2 Pajaro Watershed Toxicity Analysis Outcomes

Once all necessary data was compiled, we chose five subwatersheds in the Pajaro River watershed in which to focus our efforts based on the apparent need for toxicity reduction and water quality improvement. These areas largely correlated to locations where agricultural land was located adjacent to waterways, and where pesticide use and toxicity was high. Now that the baseline assessment is complete and we know where to focus our work, we will reach out to growers in those five subwatersheds to start the project implementation process.

4CONCLUSIONS

My time spent at the RCD was very informative and eye opening with regards to challenges that growers face and the current state of our lands and waters that make this region one of the most agriculturally productive ones in the world. Few deny that there are local water quality issues that have arisen locally due to years of large-scale agriculture, but reaching consensus on the best way to improve water quality is not easy. Regardless, the collaborative, non-regulatory approach the RCD takes is essential for progress in the region.

There are certainly ways that growers and land managers could improve their practices to reduce harmful effects to the surrounding environment. However, even if the intention is there, oftentimes the limiting factors are time, technical expertise, and money. The demands of the agricultural industry are extreme, profit margins are thin, and growers do not always have the time or luxury to experiment with alternative ways of growing that could impact their yield. This can lead to a “business as usual” approach, without questioning if the practices will ensure the success of the operation in the future or perhaps cause unforeseen problems. For this reason, programs like those that the RCD provides are essential in order to support farmers in optimizing their operations. The progress may be slow, but in my extensive review of the toxicity data and pesticide use reporting data for the Pajaro watershed, toxicity levels are improving, showing that the measures local growers are taking are indeed paying off.

This internship was exactly what I was looking for to further my future career in watershed science with an emphasis on improving water quality in agricultural areas. I was also able to make connections with a number of USDA employees dedicated to similar work in the region, and I look forward to cultivating those relationships in the years to come in future positions with USDA agencies.