Qian, Song S. and Chauncey W. Anderson. "Exploring Factors Controlling the Variability of Pesticide Concentrations in the Willamette River Basin Using Tree-Based Models." ***Environmental Science and Technology*** **33.19 (1999): 3332-3340.** (reviewed by Lucy Cho)

This article was written for the third part of a multi-phase Willamette River Basin Water Quality Study. While the first two phases of the study provided information on the concentrations and frequencies of pesticides found directly in the river, this paper focuses on the third phase of the study led by the U.S. Geological Survey, which answered the questions of what concentrations and frequencies of pesticides are found in small agricultural and urban *streams* in the Willamette River Basin, and what factors are involved. They believe that once the factors are identified, pesticide levels in the river basin can be controlled and even prevented.

This paper describes the data collected on the most commonly detected pesticides and herbicides including atrazine, desethylatrazine, simazine and metolachlor, herbicide diuron, and a few that are not as commonly detected, which were diazinon, pronamide and tebuthiuron. The variables tested by the USGS study were suspended sediment (SS), nutrient concentrations, 5-day biochemical oxygen demand (BOD5), stream temperature, dissolved oxygen (DO) and pH. Also compiled was information of watershed land use, and the application of pesticides in different areas were estimated. It was found that in agricultural areas, the general concentrations of pesticides was greatest, and that seasonal differences and the number of crops grown and produced in those areas led to various concentrations as well.

Critique

This paper was part of an interesting and very complete study of the Willamette River Basin and its water quality. I think it addressed the issue of the extent of pollution in the urban and rural streams in the river basin due to pesticides rather completely. However, it provided no information on the effects of the 36 different pesticides detected, on humans and the living organisms in the river. Its focus was very narrowly on what factors led to high or low concentrations and frequencies of different pesticides in the streams. What bothered me about this study was that while the results were conclusive and consistent with the hypothesis, the patterns that were observed and described in the paper seemed almost too obvious. For example, it was stated that according to their results, pesticide concentrations were highest in agricultural areas of the river basin.

However, the usefulness of this research comes in the analysis of the raw data and equations they designed. For example, looking at the number of crops grown in a specific agricultural area, and the measured amounts of pesticides in the streams of those areas, their equations allow one to predict the concentrations of pesticides in other streams. Another very useful technique described in this paper is the use of tree-models to determine the greatest factors that contribute to the concentration and frequency of a specific pesticide. Using these models and the data collected, a very detailed hierarchy of contributing factors can be made for every pesticide detected in these streams. While this paper did little more than provide facts, I believe the analysis techniques used in this study can be very useful for future

studies done on the Willamette River Basin.

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