STUDY OBJECTIVES

Because irrigation is extensively practiced in New Mexico and the pilot study area, it was imperative to assess how current farming practices affect the leaching losses of applied agricultural chemicals and their potential impact on ground-water contamination. Most applied water is given sufficient time to infiltrate the soil. Consequently, leaching of applied agricultural chemicals likely is the main avenue through which ground water is contaminated. Understanding the pollution potential of agricultural chemicals under practices currently used by local farmers would assist in devising Best Management Practices (BMPs) that minimize leaching losses of agricultural chemicals under irrigated conditions. Because the water table in the pilot study area is about 180 cm below the soil surface and irrigation is practiced intensively in the valley, ground water is potentially vulnerable to contamination from agricultural chemical applications. Therefore, agricultural chemicals must be managed effectively to control leaching and reduce the pollution potential of applied chemicals.

Overall study objectives were to assess the sensitivity of Mesilla Valley ground-water aquifers to contamination from pesticide use, to identify and evaluate BMPs for effectively reducing pesticide leaching, and to protect the area's ground-water resources from contamination. The sensitivity assessment would develop and investigate the employment of a modified DRASTIC model in a GIS framework for use in establishing priority areas for nonregulatory and regulatory pesticide programs. To evaluate management practices, the specific objective was to use the IRRSCHM model to assess comparatively the impact that area farmers' management practices and selected irrigation scheduling management practices could have on pesticide leaching and concentrations below the 180-cm soil profile.

SPECIFIC OBJECTIVES

Phase 1 - Pilot Study

Objective 1: Sensitivity Assessment

A pilot study in the Mesilla Valley of Doña Ana County, New Mexico was initiated to develop the most appropriate approach and format. This process could then be undertaken in other potentially vulnerable areas of the state. The Mesilla Valley in Doña Ana County was selected based on the intensity of the county's pesticide applications and the availability of information required for the analysis. Experience and added insight was expected to be gained in how to gather, process, and analyze data most efficiently.

The study would utilize a procedure similar to the DRASTIC (Aller et al. 1985) model and enhancements made to it by EPA and USGS (Hearne et al. 1992), for evaluating ground-water sensitivity. This analytic framework assesses relative sensitivity of land units by integrating mapped information on vadose zone geology, soils, recharge, hydraulic conductivity, slope, aquifer media and depth to water.

Objective 2: Process Modeling and BMP Evaluation

A process model would be utilized to estimate the pesticide concentration going below the root zone, calculated for current farming practices and proposed BMPs. The current practices would be obtained by surveying local farmers. The BMPs to be evaluated would be selected in cooperation with the USDA, Natural Resource Conservation Service (NRCS, formerly SCS) and the New Mexico Cooperative Extension Service (NMCES). Both services are involved in developing and delivering BMPs to the state's agricultural community. The NRCS currently recommends use of tensiometers to schedule irrigation. However, there are many ways to operate the irrigation system based on tensiometer readings and numerous procedures to determine the number and depth of those tensiometers. Each increasingly complicated procedure requires more sophistication and understanding of the water and chemical movement processes.

Project Linkages to Other Programs

The ground-water aquifer sensitivity product—an intermediate product—developed under this project was expected to be useful to other state agencies, local governments, municipalities, and residents as planning tools for protecting ground water. This product could be used to evaluate other known and potential point sources of ground-water contamination, including leaking underground storage tanks, landfills, spill sites, hazardous waste treatment, storage and disposal facilities, and other contamination sources as well as provide useful information for the development, assessment and evaluation of Wellhead Protection Areas and their vulnerability to different sources of contamination. This would enable state and local governments to develop comprehensive management plans for protecting ground water and municipal wells from nonpoint contaminant sources in their areas.