



Are Streams in Agricultural and Urban Areas Contaminated by Pesticides?

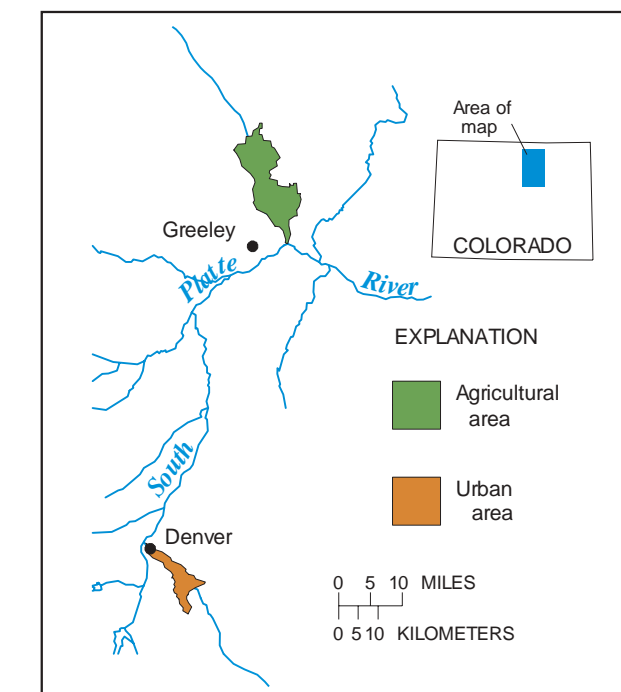
To answer this question, a study of pesticides in streams in a small agricultural area and a small urban area in Colorado was conducted in 1993 by the U.S. Geological Survey (USGS) as part of the National Water-Quality Assessment (NAWQA) program. The results indicate that pesticides are present in streams, and both agricultural and urban areas are probable sources of the contamination. In the agricultural area, 30 pesticides were detected and in the urban area, 26 pesticides were detected at least once during the thirteen month study. In the agricultural area, the herbicides alachlor (two samples) and cyanazine (four samples) and the insecticide diazinon (one sample) were the only pesticides that exceeded the U.S. Environmental Protection Agency's maximum contaminant levels (MCLs) or health advisory levels (HALs) for drinking water. No pesticides exceeded MCLs or HALs in the urban area.

Regardless of whether you live in a city surrounded by thousands of people, or in the country, surrounded by open space, you probably have used pesticides at one time or another.

Although the term "pesticide" refers to any compound that is designed to control pests, the most widely used pesticides are herbicides (used for weed control) and insecticides (used for insect control).

Through physical processes such as erosion, surface runoff, and ground-water movement, trace amounts of the pesticides we use on lawns, gardens, and crops can eventually end up in local streams. Even at very low concentrations, pesticides in streams can make water unsuitable for human consumption or pose a hazard to aquatic life. Although most people do not drink water directly from streams, conventional treatment plants do not always remove all the pesticides that are dissolved in water.

In recent years, several studies have detected pesticides in streams in agricultural areas (mainly in the Midwest), but little information has been gathered on pesticides in streams in agricultural and urban areas in Colorado. The USGS, as part of the NAWQA program, began a study in 1993 to determine the presence of pesticides in selected streams in Colorado. Portions of two tributary streams of the South Platte River were chosen for sampling; one located in downtown Denver (to represent an urban area setting) and one located northeast of Greeley, situated in an area of irrigated agriculture. Corn,



alfalfa, sugar beets, and pinto beans were the major crops grown in the agricultural area.









Twenty-five water samples that were collected at least monthly in each area from April 1993 through April 1994 were analyzed for 47 pesticides (27 herbicides and 20 insecticides).

Pesticide detections in the agricultural area were predominated by herbicides such as atrazine, metolachlor, EPTC, cyanazine, DCPA and alachlor, which commonly are used on the types of crops grown in the area.

Selected information for the most frequently detected pesticides, April 1993 - April 1994

AGRICULTURAL AREA

Compound and percentage of samples with detections	A	M	J	J	A	S	O	N	D	J	F	M	A
Atrazine (100)		S											
Metolachlor (100)		S											
Prometon (100)													
EPTC (88)		S											
Cyanazine (84)		S											
DCPA (72)													
Deethylatrazine (68)													
Alachlor (64)		S											
Pendimethalin (48)		S											
Carbofuran (48)		S											
Simazine (44)													
Ethalfuralin (32)													
Butylate (28)		S											
Diazinon (24)													
Chlorpyrifos (24)		S											
Propargite (24)													
Trifluralin (20)		S											
Carbaryl (20)													

Herbicide	Insecticide
	
	
	
	
	Maximum concentration
	Maximum concentration occurred in storm runoff
	Detected at least once
	No detection

URBAN AREA

Compound and percentage of samples with detections	A	M	J	J	A	S	O	N	D	J	F	M	A
Prometon (92)					S								
Simazine (80)													
Diazinon (72)												S	
Carbaryl (72)					S								
DCPA (84)		S										S	
Atrazine (44)					S								
Chlorpyrifos (32)		S											
Malathion (28)					S								
Tebuthiuron (20)											S		
Deethylatrazine (12)					S								
Cyanazine (8)													
Metolachlor (8)													
Alachlor (4)													
EPTC (4)		S											
Lindane (4)													S
Propanil (4)													
Triallate (4)		S											

Pesticides in the agricultural area were more frequently detected during the growing season (April through September), with some of the higher concentrations occurring just after pesticide application. Increased pesticide detections during the growing season might be caused, in part, by irrigation return flows; water that drains to the stream after application to crops can transport pesticides away from the fields.

The most commonly detected pesticides in the urban area were the herbicides prometon and simazine, used for long-term weed control, and the household insecticides diazinon and carbaryl.

Although less information has been compiled on application timing in urban areas, pesticides also were detected more frequently, and in higher concentration, during warm summer months when pesticide applications were most likely to occur.

In both areas, the highest concentrations of pesticides generally occurred in storm runoff. During storms, pesticides are washed off land surfaces by precipitation and transported to the streams in runoff.

The year-round detection of some pesticides in both areas at consistently low concentrations, regardless of season or streamflow volume, could indicate that these compounds persist in the shallow ground-water system year-round. Examples of some of the more persistent pesticides are atrazine (in the agricultural area), simazine (in the urban area), and the long-term soil sterilant, prometon (in both areas).

Information on technical reports and hydrologic data related to NAWQA can be obtained from:

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