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U.S.

Pesticide Levels in Waterways Have Dropped, Reducing the Risks to Humans

By MICHAEL WINES SEPT. 11, 2014

The development of safer pesticides and legal restrictions on their use have sharply reduced the risk to humans from pesticide-tainted rivers and streams, while the potential risk to aquatic life in urban waters has risen, according to a two-decade survey published on Thursday.

The study, conducted by the United States Geological Survey and published in the journal Environmental Science & Technology, monitored scores of pesticides from 1992 to 2011 at more than 200 sampling points on rivers and streams. In both of the last two decades, researchers reported, they found insecticides and herbicides in virtually all of the waterways.

The results nevertheless documented a striking decline in dangers to humans from pesticide pollution. From 1992 to 2001, 17 percent of agricultural streams and 5 percent of other streams contained at least one pesticide whose average annual concentration was above the maximum contaminant level for drinking water. But in the second decade, from 2002 to 2011, the survey found dangerous pesticide concentrations in only one stream nationwide.

The decline occurred in part because manufacturers introduced new pesticides that are less toxic or require smaller applications than older compounds. Much of it was driven by regulatory actions that canceled or restricted the use of particularly hazardous pesticides like dieldrin and lindane.

“It’s very clear in the data that regulatory changes in use do affect what you see in the streams,” said Wes Stone, a hydrologist with the Geological Survey in Indianapolis and the lead researcher on the survey. “It’s showing what you would expect, and that’s good.” Mr. Stone and the study’s other two authors, Robert Gilliom and Karen Ryberg, conducted the research as part of the Geological Survey’s National Water-Quality Assessment Program.

The use of insecticides dropped about one-third in the 1990s, mostly because of changes forced by regulatory actions, and remained more or less constant during the first decade of the 2000s. The opposite was true of herbicides, whose use was steady during the 1990s but then rocketed as the weed killer glyphosate became popular on farms and in gardens.

While human-health hazards declined over 20 years, the share of streams whose pesticide levels posed a potential threat to aquatic life remained mostly steady: Between 60 and 70 percent of agricultural streams and roughly 45 percent of streams in mixed-use areas, registered levels above the benchmark for potential harm to aquatic life.

Urban streams — the survey monitored 30 — were the glaring exception. There, the proportion of streams with pesticide levels above the aquatic-life benchmark soared from 53 percent in the first decade to 90 percent in the second, even as other pesticides were phased out.

The culprits, researchers found, were two pesticides, fipronil and dichlorvos. Fipronil, used in many

products, from flea collars to roach killers, was not included in the first decade's surveys but emerged in the second as an alternative to other pesticides whose uses were being restricted. It was found to exceed potentially harmful levels for aquatic life in 70 percent of streams in the second decade. Other byproducts of fipronil's natural decay — longer-lived and more toxic than the insecticide itself — also were widely detected in urban streams.

Dichlorvos, an insecticide found on farms and in household applications like no-pest strips and dog de-wormers, exceeded the benchmark in more than 45 percent of the urban streams measured.

More worrisome, perhaps, was a caution at the survey's beginning: Any potential harm to aquatic life is probably worse than the study suggests because potentially important pesticides were not included in the survey, and many others are not measured at all.

Both pesticides cited were also found to pose potential hazards in other streams, but not to the extent found in cities. And the degree of pollution in cities varied: Fipronil contamination was common in cities of the South and West, but less so in the Northeast and Midwest. The researchers said it was not entirely clear why.

"Getting good data to explain the causal mechanism of this can be very difficult in urban environments," said Ms. Ryberg, a Geological Survey scientist in Bismarck, N.D. "We have pretty good data for agricultural uses, but they don't have the same for urban areas" because sales of household products are not as closely tracked.

Ms. Ryberg said she suspected that urban contamination was not from the misuse of fipronil — applying too much, too often — but because it had become ubiquitous in some places.

Notably, the Geological Survey study did not monitor some of the most widely used pesticides, including pyrethrins, a garden insecticide also used for flea control in pets, and glyphosate, commonly known by the brand name Roundup. For many compounds, researchers either lack the money to monitor contamination or have yet to develop an accurate test.

"There are constantly new pesticides coming out," Ms. Ryberg said, "and there's a lag time between deciding a pesticide will be around for a while, then developing a lab test to detect it, and then having enough data to analyze it. In science, that's a concern: How do you stay on top of it?"

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