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Pesticides in the Nation's Streams and Ground Water, 1992-2001—*What findings may mean to human health, aquatic life, and fish-eating wildlife*

The U.S. Geological Survey (USGS) released a report today (March 3, 2006) describing the occurrence of pesticides in streams and ground water during 1992-2001, concluding that pesticides are typically present throughout the year in most streams in urban and agricultural areas of the Nation, but are less common in ground water. Findings show that pesticides are seldom at concentrations likely to affect humans, but do occur in many streams, particularly those draining urban and agricultural areas, at concentrations that may affect aquatic life or fish-eating wildlife.

Pesticide concentrations and potential effects on human health

- Concentrations of individual pesticides analyzed in this study were usually lower than U.S. Environmental Protection Agency (EPA) drinking-water standards and guidelines for human health.
- Less than 10 percent of streams draining agricultural and urban watersheds, and less than 2 percent of streams draining undeveloped watersheds or those with a mix of land uses had concentrations greater than these human-health benchmarks.
- All USGS stream samples were representative of ambient, untreated water, and not finished, treated drinking water. The samples were not collected at drinking-water intakes.
- For perspective, the findings were evaluated in the context of the Nation's 1,679 public water-supply intakes on streams. Eighty-seven percent of these intakes are on streams draining watersheds with undeveloped or mixed land use (as classified by USGS), and are, therefore, unlikely to withdraw water with concentrations greater than a human-health benchmark.
- Pesticides were less common in ground water than streams; less than 1 percent of domestic and public-supply wells sampled by USGS exceeded EPA drinking-water standards and guidelines. Most exceedences were by dieldrin, which is no longer used.

Pesticide concentrations and potential effects on aquatic life and fish-eating wildlife

- Pesticide concentrations exceeded water-quality benchmarks for the protection of aquatic life and (or) fish-eating wildlife in more than one-half of the sampled streams in urban and agricultural areas.
- More than 80 percent of urban streams sampled had concentrations that exceeded one or more benchmarks, mostly by the insecticides diazinon, chlorpyrifos, and malathion, although exceedences declined during the study period (95 percent of urban streams sampled during 1993-1997 and 64 percent during 1998-2000).
- USGS findings show strong relations between the occurrence of pesticides and their use. Some of the frequently detected pesticides, including the insecticide diazinon and the herbicides alachlor and cyanazine, are declining since their uses were reduced or cancelled.

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- DDT, dieldrin, and chlordane—organochlorine pesticides that were no longer in use when the study began—were the most frequently detected compounds in bed sediment and fish in urban and agricultural areas where they accumulate in aquatic ecosystems. Concentrations of these compounds in fish declined following reductions in their use during the 1960s and elimination of all uses in the 1970s and 1980s, and continue to slowly decline.
- Just as notable as the declines, however, is the finding that these organochlorine pesticides still occur at levels greater than benchmarks for aquatic life and fish-eating wildlife in many urban and agricultural streams across the Nation. This is due to their persistence in the environment. Because these compounds tend to adhere to sediment, soil-erosion management could help to reduce the transport of these residual compounds to streams.
- The most common mode of pesticide exposure is to mixtures rather than individual pesticides. The common occurrence of pesticide mixtures, particularly in streams, means that the total combined toxicity of pesticides in water, sediment, and fish may be greater than that of any single pesticide compound that is present.
- Assessments of the potential effects of pesticides on aquatic life and fish-eating wildlife are complicated not only by mixtures of currently used pesticides, but also by the combined presence in streams of currently used pesticides (as well as their degradates) and the historically used organochlorine compounds derived from pesticides that were largely banned prior to 1990.
- Studies of mixtures are still in the early stages, and it may take years for researchers to advance understanding of the actual potential for effects. USGS findings indicate that studies of mixtures should be a high priority.

Context for interpreting pesticide levels and potential effects

- The detection of pesticides alone does not necessarily translate into adverse impacts on humans, aquatic life, or fish-eating wildlife. USGS analytical methods are designed to measure very low concentrations—sometimes parts per trillion—that are well below water-quality benchmarks for most pesticides. Use of these analytical methods is necessary to identify emerging issues and to track changes in concentrations over time.
- The USGS report is not a risk-assessment study and findings should not be confused with risk assessments for specific pesticides by the EPA. However, to place findings in a context for understanding potential effects on human health, aquatic life, and fish-eating wildlife, measured concentrations by USGS were compared to water-quality benchmarks derived from standards and guidelines established by EPA, toxicity values from EPA pesticide risk assessments, and selected guidelines from other sources. Water-quality benchmarks are estimates of concentrations above which pesticides may have adverse effects on human health, aquatic life, or fish-eating wildlife. The USGS screening-level assessment is primarily intended to identify and prioritize needs for further investigation.

How USGS data are used—USGS has worked closely with the EPA during the 10-year study, who uses the data extensively in their exposure and risk assessments for regulating the use of pesticides. For example, EPA used USGS data in its risk assessments for the reevaluation of diazinon, chlorpyrifos, cyanazine and alachlor. Uses of three of these pesticides (diazinon, chlorpyrifos and cyanazine) have now been significantly limited, and usage of alachlor was voluntarily reduced and largely replaced by a registered alternative. The USGS findings show strong relations between the occurrence of pesticides and their use, and point out that some of the frequently detected pesticides, including the insecticide diazinon and the herbicides alachlor and cyanazine, are declining. As new pesticides are approved for use, EPA will continue to need monitoring data to ensure that levels in the environment are safe.