Sources, occurrence and predicted aquatic impact of legacy and contemporary pesticides in streams

We couple current findings of pesticides in surface and groundwater to the history of pesticide usage, focusing on the potential contribution of legacy pesticides to the predicted ecotoxicological impact on benthic macroinvertebrates in headwater streams. Results suggest that groundwater, in addition to precipitation and surface runoff, is an important source of pesticides (particularly legacy herbicides) entering surface water. In addition to current-use active ingredients, legacy pesticides, metabolites and impurities are important for explaining the estimated total toxicity attributable to pesticides. Sediment-bound insecticides were identified as the primary source for predicted ecotoxicity. Our results support recent studies indicating that highly sorbing chemicals contribute and even drive impacts on aquatic ecosystems. They further indicate that groundwater contaminated by legacy and contemporary pesticides may impact adjoining streams. Stream observations of soluble and sediment-bound pesticides are valuable for understanding the long-term fate of pesticides in aquifers, and should be included in stream monitoring programs.