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Impact of pesticide use by smallholder farmers on water quality in the Wakiso District, Uganda

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As in many tropical countries, farmers of the Wakiso District rely on heavy use of pesticides to protect crops and animals. This may impair human and environmental health due to poor application techniques, misuse of pesticide bins or diffuse pesticide losses from the treated fields during intense tropical rainstorms.
The extent of pollution in different environmental compartments however, are generally only poorly documented. The same holds true for quantitative data on the relevance of different transport pathways of pesticides into the environment. Part of the limited knowledge is caused by the demanding sampling and analytical techniques that are necessary to obtain robust data on the actual pollution status. Especially in surface waters, pesticide concentration may vary rapidly in time such that grab samples may yield a very incomplete picture. This incompleteness was often enhanced because of limited analytical windows that covered only a small fraction of the pesticides actually used.
In this presentation, we describe an approach to overcome these limitations to a large extent by using three different passive sampling devices and two broad analytical techniques (GC-MS/MS, LC HR-MS) that allow the quantification of about 260 different pesticides. We will present how these approaches are implemented in the catchment area of the Wakiso District in Uganda. This area is intensively used by smallholder farmers who grow a large set of different crops. Diffuse losses are expected to occur mainly during the two rainy seasons (March to May and September to November). Accordingly, the study will focus on this situation.