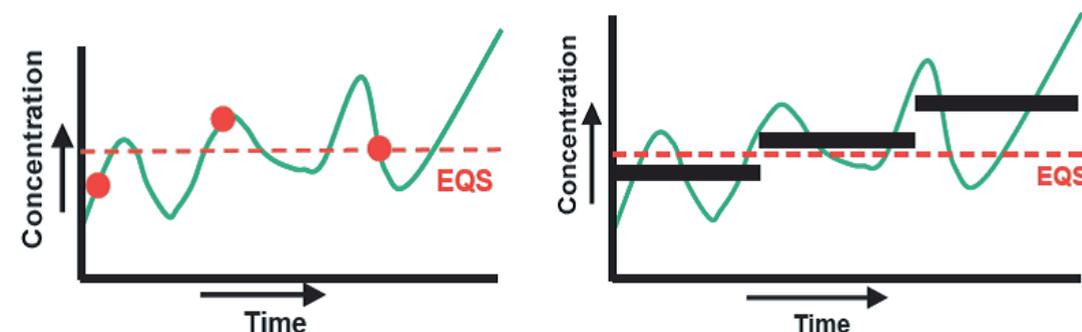


The added value of passive sampling in the monitoring of organic pollutants

Good and effective monitoring of water quality is key to determining whether, and where, measures should be taken to improve water quality. Monitoring normally involves the grab sampling of several litres of water, which are then sent to the lab for immediate extraction and analysis. This provides a snapshot of the water quality but compounds with an irregular emission pattern such as pesticides can easily be missed. Furthermore, concentrations are often below detection limits because of the small volumes sampled. The information obtained about the water quality is therefore limited.

Water-quality monitoring for organic pollutants can also be performed with passive sampling. A sampler with sorption material is exposed to water for several weeks or months. During the exposure, organic pollutants are sampled by diffusion from the water, resulting in a time-integrated average concentration based on large sampled volumes. This monitoring technique provides more valuable information about the substances in the water. A further benefit is that the passive samplers do not need to be extracted immediately after sampling; they can be stored in a freezer and sent easily to a laboratory later. As a result, they can be used worldwide, including remote areas with limited analytical infrastructure. In recent years, Deltares has further developed the technique and applications in a range of water types such as sewage water, surface water and groundwater, as described below.

Passive sampling was used at two hospitals in the Netherlands to monitor pharmaceuticals in the sewage water. The aim was to establish a picture of the main sources of these compounds reaching the sewage treatment plant. The samplers were used at several locations in the sewage system and analysed for a



Grab sampling versus passive sampling

range of pharmaceuticals. It emerged that hospitals were the main source of only a small number of pharmaceuticals. Most of the load of these compounds came from other sources, often domestic waste water. Passive sampling detected more compounds than grab sampling.

Clients outside the Netherlands are also increasingly interested in passive sampling. Deltares was asked by the Nature Conservancy in California to use the technology to determine the levels of pesticides in an area used as a sanctuary for cranes. The results showed that a number of pesticides come from the crops grown on Staten Island and so the Nature Conservancy is rethinking their crop programme.

Detecting pesticides and antibiotics in groundwater can also result in better water protection. The detection of lower concentrations is beneficial and so passive samplers were developed for monitoring groundwater. The samplers were tested in two agricultural areas in the province of Noord-Brabant: application was straightforward, no additional pumping was required and it was possible to install the samplers for several months. Many more compounds were detected in low concentrations that had been missed by conventional monitoring.

Further reading:

www.stowa.nl/publicaties/publicaties/overzicht_toepassingsmogelijkheden_van_passive_sampling