

The use of German environmental ESB data in chemical management and monitoring

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Abstract

The relevance of monitoring data in European environmental and chemical legislation is increasing. Environmental specimen banks can support this process with high quality data from well documented and standardized sampling programs. Currently, we are retrospectively investigating spatial and temporal trends for e.g. per- and polyfluoroalkyl substances, brominated and chlorinated flame retardants, plasticizers, fragrances, pharmaceuticals, microplastics and cyclic siloxanes. On a routine basis we are measuring various elements, legacy POPs and organic contaminants from the European marine and freshwater monitoring programmes. Some of the compounds are measured in selected sample types only, other substances are analysed in all 15 sample types from the terrestrial, freshwater and marine compartment and for up to 30 years.

Today, novel detection methods are coming onto the market which, together with conventional targeted approaches, offer a broader overview of the environmental impact of pollutants than was previously the case. We test Non-Target Screening (NTS) approaches in selected ESB matrices and discuss the potential and data requirements with regulators so that these novel data can be used accurately and effectively in chemical management. Also, NTS provides digitalized measurement data, which is obviously a very complementary approach to archiving environmental samples in ESB collections. ESBs may use NTS as an efficient screening tool and optimise the efficient use of archived samples in the future.

New detection methods enable ESB to measure not only contaminants but also other endpoints. For example, abiotic samples such as soil, sediment and SPM also contain DNA from the environment that survives storage at ultra-low temperatures in the sample archives. Such ESB samples can now be used to identify spatial and temporal trends for changes in biodiversity with barcoding and DNA metabarcoding approaches. Also, free DNA or DNA contained in microorganisms can be analysed to identify antibiotic resistance genes in ESB samples. The use of archived ESB samples is a great chance for ESBs since no other programme is capable to explain the changes in biodiversity and antibiotic resistance over the past decades and since they are among the major environmental and health policy challenges.

We are very interested in connecting to other ESB activities in support of European and international chemical management. Another important point for the cooperation of ESBs is their visibility and the target-oriented information of the public, scientists and other interested groups about the long-term changes of the environment.

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