Ecotoxicological test methodology for environmental screening of the European Water Framework Directive´s Priority substances - adjusted to Swedish regional conditions

Susanne Asker

The aim with this report was to make an inventory of and collect information about various bioassays that could be useful in river basin management by water authorities and County Administration Boards in Sweden. The purpose was also to make an evaluation of which measuring parameters and methods are most appropriate for various applications. Suggestions for ecotoxicological test methodology were made that will be used in future pilot testing within the development project run by 15 county administration boards in different parts of Sweden.

The results and conclusions from the inventory and information search are as follows:

- Tier 1 screening of water systems should consist of a battery of a minimum of three tests from three trophic levels in order to be representative of the entire ecosystem under investigation. Suggestions for test batteries are made for whole sediment and surface water samples, adjusted to Swedish regional conditions, and these are in accordance with recommendations from the OSPAR Commission. Evaluation criteria are based on so called environmental risk limits (ERLs) which determine whether the biological effects observed are neglible, maximum permissible or serious effects. The test battery should consist of a combination of short term acute and prolonged (sub)lethal tests in order to cover the most sensitive endpoints/species. The test batteries suggested are based on *in vivo* assays, but one or more *in vitro* assays can be added to the test battery in order to identify specific pollutants.

- Water extraction is the recommended method since the surface water samples can then be pre-concentrated up to a 1000-fold before being applied in the *in vivo* or in *vitro* assays. Without pre-concentration there may not be any effects in the assays, and the other advantage is that confounding factors such as salinity, pH fluctuations, high ammonium content, ion imbalance and hardness in the samples are avoided with water extraction. However some pollutants, especially metals may get lost in this process.

- Acute tests on microbial organisms such as bacteria which represent a third trophic level (decomposers) are less expensive, less labour-intensive and can be completed in a few hours up to 24 hours. Test kits which involve miniaturisation and microscale procedures are available for prokaryotic genotoxicity assays, and also for assays on other trophic level organisms such as invertebrates, plants and algae. They can be performed in non-specialized laboratories and are a cheaper alternative compared to tests performed by accredited laboratories.

Degree project in Biology, Master of Science (2 years), 2011
Examensarbete i biologi 45 hp till master-examen, 2011
Biology Education Center and Department of Organism Biology, Uppsala University
Carried out at County Administration Board of Blekinge, Karlskrona
Supervisors: Jan Örberg, Fredrik Andreasson and Ann-Sofie Wernersson