

Science for Environment Policy

Water pollution: finding appropriate limits for particulate matter

One of the most common causes of water quality impairment is suspended particulate matter (SPM). A study by a team of UK researchers suggests that standards for SPM set by EU member states to help achieve the WFD should reflect the natural differences in the levels of this pollutant that are expected in contrasting environments. Their study provides hints as to how a potential alternative system for regulating SPM concentrations might be devised.

SPM is a term used to describe nano-scale to sand-size particles that are suspended in the water column of streams, rivers and lakes. Water containing SPM has to be more rigorously treated before consumption, leading to higher water treatment costs. SPM also affects aquatic wildlife and the value of aquatic ecosystems to society.

The current guideline for SPM, which is part of the EU Freshwater Fisheries Directive¹, states that concentrations should not exceed 25 mg per litre. In 2013, this directive will be repealed and waters currently designated as Fish Directive waters will become protected areas under the Water Framework Directive. There is an obligation on EU member states to ensure that under the WFD they provide at least the same level of protection as was provided for under the repealed directives. This is likely to necessitate MSs carrying out an assessment of which standards included in the repealed directive should be carried over into the WFD standards and whether these standards should be refined.

The researchers set out to firstly compare SPM concentrations observed across contrasting ecosystems that were regarded as being in high ecological status, and, secondly, to see if they could establish the necessary environment-specific SPM limits using a mathematical modelling approach. They used SPM data from 638 sites in UK streams and rivers, covering a wide range of environments. From the 638 sites, the team of researchers identified 42 different types of ecosystem. Only in one type of ecosystem-type did the average SPM concentration exceed the current blanket limit. However, the results of the study suggest that SPM concentrations vary significantly (by up to 15 times) between the contrasting ecosystems. In one ecosystem-type, the average SPM concentration was less than 2 mg per litre, far below the blanket limit.

The researchers went on to test whether, using their model, they could predict the SPM range, within 6 mg per litre, for a given site. The key inputs for the model included environmental information about the mean annual temperature and rainfall, altitude, distance from source, slope, channel width and depth, and the proportion of the catchment area comprised of clay, chalk, and hard rocks as the solid geology, and blown sand as the drift geology. The model predicted the closest or next closest range for 90% of the sites.

According to the researchers, although their model still needs refining, their system of establishing ranges for SPM concentrations suggests a way of limiting concentrations based on the type of ecosystem rather than under one all-encompassing 25 mg per litre limit. In addition, they say, the results suggest that the current SPM limit may be inappropriate for one particular type of ecosystem that exceeded it in their study, as the limit will generally be exceeded in this type of ecosystem, no matter how much the land-use is de-intensified. For some of the other types of ecosystems identified, the SPM limits may be too high, as some freshwater species are negatively affected at concentrations below 25 mg per litre.

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1. See: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:264:002:0:0031:EN:pdf>