



## Groundwater monitoring: reconciling cost effectiveness, legal requirements and enforcement realities

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In the second and third implementation reports on the Water Framework Directive, the European Commission drew attention to gaps in the monitoring networks that must be established by member states under art.8. Groundwater monitoring networks should provide a reliable picture of groundwater levels and a 'coherent and comprehensive' overview of chemical status so that anthropogenically influenced long-term upward trends in pollutant levels can be tracked. Confidence in this overview should be such that "the uncertainty from the monitoring process should not add significantly to the uncertainty of controlling the risk", with densities being sufficient to allow assessment of the impact of abstractions and discharges on levels in groundwater bodies at risk.

The fact that the legal requirements for the quality of monitoring networks are set out in very vague terms highlights the many variables that can influence the design of monitoring networks. However, the quality of a monitoring network as part of the armory of environmental regulators is potentially of crucial importance. If, as part of enforcement proceedings, a regulator takes an offender to court and relies on conclusions derived from monitoring networks, a defendant may be entitled to question those conclusions. If the credibility, reliability or relevance of a monitoring network can be undermined, because it is too sparse, for example, this could have dramatic consequences on the ability of a regulator to ensure compliance with legal standards. Some recent Spanish cases have rejected GIS-derived data as evidence. On the other hand, it can be ruinously expensive to set up a monitoring network in remote areas and regulators must therefore balance the cost effectiveness of these networks against the chance that a court might question their fitness for purpose. This presentation, based in part on findings from the EU-funded GENESIS project, will look at practice around the world on the ways these are balanced (e.g. Finland, Australia, Scotland, Spain), examine how courts have treated evidence from models and monitoring networks, and make recommendations on how practice might be improved.