DEGRADATION RATE MEASUREMENTS IN THE FIELD THROUGH STABLE ISOTOPE ANALYSIS – TOOL

RIVER BASIN MANAGEMENT ISSUE

Water Quality						Water Quantity		Alterations		Others
1	2	3	4	5	6	7	8	9	10	
		C	C							

(1) Diffuse pollution by agriculture
(2) Salinisation
(3) Contaminated sediment and floodplain soils
(4) Large scale pollution due to past mining / industries activities
(5) Pollution by organic matter
(6) Emerging compounds
(7) Water scarcity
(8) Floods and low flow
(9) Hydromorphological alterations
(10) Soil erosion

C = System Characterisation
T = System Trend
M = System Monitoring
R = System Remediation, Mitigation

RIVER BASIN

Danube	Ebro	Meuse	Elbe	Brévilles	Others
		✓- Spec			Not river basin specific

Spec. : Results specific to selected River Basin

KEY FINDING TYPE

Laboratory based	Field based	Modelling
✓	✓	

BENEFITS TO END-USERS

Technical		Management	Policy	
WFD Implementation	Research	River Basin	Compliance	Policy making
(✓)	✓			

INTRODUCTION

BGC 5 focuses on the degradation of pollutants under the existing and enhanced conditions present in the Basin cases. Biodegradation rates were determined in the laboratory (batch tests) and in the field (through stable isotopic analyses). Impact of temperature, redox condition, and oxygen on biodegradation rate was quantified. BGC5 also dealt with bioavailability and toxicity tests of emerging compounds such as nonylphenol and other estrogens.

TOOL SUMMARY

This method of degradation rate measurement in the field can be used to determine degradation rates in situ and for monitoring the degradation. It has been developed in AT for PAHs contaminants and can be used for all compounds that show fractionation, like chlorinated ethenes, chlorinated ethanes, chlorinated benzenes, BTEX and MTBE. This method has the advantage of giving an instantaneous degradation rate measurement as it is not solely based on monitoring the decrease in contaminant concentration through time (such as for batch experiments) but on stable isotope measurements of field samples (spatial or in time). However, when using spatial data, a proper flow pattern needs to be known to calculate the degradation rate. As a consequence, the method reliability depends very much on the flow pattern reliability. Furthermore, a specialised laboratory is needed to perform the stable isotope analyses. The tool is described in DL BGC 5.4.