

## Kd FUNCTIONS TO DEFINE RELATION BETWEEN INORGANIC POLLUTANT MOBILITY (SOIL TO WATER), THE MAIN BIOGEOCHEMICAL CHARACTERISTICS OF SOILS AND THE MAIN PARAMETERS OF GLOBAL CHANGE - TOOL

RIVER BASIN MANAGEMENT ISSUE										
Water Quality						Water Quantity		Alterations		Others
1	2	3	4	5	6	7	8	9	10	
		C, M, T	C, M, T							
(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					
	✓	✓			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

BGC3 studied the transfer functions (Kd) for selected metals (As, Pb, Zn, Cd and Hg). Measurements of Kd were performed on soil and sediment samples collected in the Ebro and the Meuse basin. Soil samples were collected from the vadose zone and the saturated zone. Statistical analysis of measured Kd enabled to define Kd functions for each selected contaminant and for the vadose zone and the saturated zone. First Kd functions were defined. For the root zone, a modelling approach enabled to estimate the sorption coefficient that will integrate the relevant processes affecting the fate of heavy metal in the root zone. The Kd functions will be further developed over the next 2 years of AquaTerra project. In addition, BGC3 studied biogeochemical processes associated with the release of metals from soil in the vadose zone, the root zone and the saturated zone. Impact of bacterial activities on the transfer of metals in the vadose and saturated zone is characterised from studies of bacterial biodiversity using molecular techniques. Impact of climate change (different oxygen concentrations, temperature, pH, bacterial activity), different land use (nitrate concentrations), increasing pollution (varying sulphate concentrations) and environmental parameters on the behaviour of the considered inorganic pollutants in the vadose zone and the saturated zone were assessed..

**TOOL SUMMARY**

Kd functions are formula derived from statistical analysis of Kd values. They enable to predict Kd according to a range of environmental parameters (such as climatic parameters and bacterial parameters) and soil characteristic parameters. Kd functions can be used by scientific or modellers to determine Kd values and their evolution with climate change. If Kd function are used within the right parameters range for which they have been defined, they enable to obtain Kd with good accuracy (with the exception of Kd related to Hg which needs to be further developed).