

RESULTS ON SOIL/AIR ORGANIC COMPOUNDS EXCHANGE

RIVER BASIN MANAGEMENT ISSUE									
Water Quantity					Water Quality		Alterations		Others
1	2	3	4	5	6	7	8	9	
C		C	C		C				
(1) Diffuse pollution by agriculture (3) Contaminated sediment and floodplain soils (5) Pollution by organic matter (7) Water scarcity (9) Hydromorphological alterations					(2) Salinisation (4) Large scale pollution due to past mining / industries activities (6) Emerging compounds (8) Floods and low flow (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			✓ - Spec.					
Spec. : Results specific to selected River Basin									
KEY FINDING TYPE									
Understanding Processes (lab-scale)			Characterisation (field scale)				Modelling		
✓			✓						
BENEFITS TO END-USERS									
Technical			Management		Policy				
WFD Implementation		Research	River Basin		Compliance	Policy making			
✓		✓	✓						

INTRODUCTION

The objectives of FLUX 1 are to quantify solute fluxes in the soil-groundwater system including mass transfer from and into the atmosphere. This is carried out at the local and at the catchment scale. Contaminant such as Persistent Organic Pollutants (POPs) and pesticides were monitored.

KEY ISSUES

Techniques to look at soil/air organic compounds exchange (including PCBs, HCH, PBDE (flame retardants)) were developed along the Ebro river downstream from existing factories. Organic compounds present in the soil or in the air can come from atmospheric contamination due to industrial activities, soil contamination due to industrial activities, soil contamination due to deposition of contaminated sediment in floodplain soils and activities involving emerging compounds. Therefore, specific results obtained in the Ebro address river basin issue associated with *Large scale pollution due to industrial activities, Emerging compounds and Contaminated sediment and flood plain soils*. In a more general context, techniques which enables to look at soil / air organic compounds exchange can potentially address any river basin management issue associated with soil and organic contamination such as *Large scale pollution due to industrial activities, Contaminated sediment and flood plain soils, Emerging compounds and diffuse pollution by agriculture*. Results obtained in the Ebro (Felix priority zone) are discussed with respect to river basin management issues (*Large scale pollution due to industrial activities, Emerging compounds and Contaminated sediments and flood plain soils*).

Results and data on soil / air exchange are mainly related to the system characterisation and more specifically related to the understanding of transfer of organic from soil to air and from air to soil.

- **System characterisation:** The results obtained in the Flix area (Ebro) indicated that significant amount of contaminated sediments was deposited in floodplain areas. The partitioning of the organic compounds between the soil matrix and the air was variable depending on the type of organics. They showed that HCH was released from soil to air. They also showed that some PCBs were accumulated in the soil while others were partially volatilised. The air/soil system is a dynamic system where contaminants move from air to soil and soil to air. Key parameters to quantify flux of contaminants in the soil: air system include environmental parameters (such as organic matter content, soil temperature, soil moisture, air temperature, amount of rain and amount of particles in air.) and chemical properties of the compounds (including Kd, Kow and Henry constant).

RECOMMENDATIONS

The following recommendations could be drawn from the air / soil exchange study:

- **Monitoring:** In general, there is a lack of data on organic concentration in air and soil. It is therefore recommended to build an air / soil quality database for organics. This database will enable to determine net direction and net fluxes of the contaminants (in the air water system) which are significant parameters to be included in contamination assessment.
- Organics present in air and soil come both from primary sources such as atmospheric deposition and secondary sources such as (contaminants present in soils). These two sources must be taken into account when air/soil exchange are studied.
- The techniques can be used for two contexts:
 - o Catchment scale: Average contaminant concentration in the air enabled to make an estimate of fluxes.
 - o Site-specific scale: Specific data (with good resolution in time and space) enabled to determine fluxes from point source pollution.
- Special equipment to measure water flux in soil, to measure carbon dioxide in soil and air is needed to measure air / soil fluxes. This equipment is available only on a few sites in the world.

These recommendations can be useful for the following **end-users**:

- **People who face organic diffuse pollution issue and need to quantify soil/air fluxes.**
- **River basin managers**