

UNDERSTANDING OF HYDROGEOLOGICAL AND HYDRODYNAMIC PHENOMENON CONTRIBUTES TO A BETTER UNDERSTANDING OF POLLUTANT TRANSFER

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

HYDRO 2 aims at collecting geological and hydrogeological data in order to improve the **understanding of hydrogeological / hydrodynamic phenomenon and contribute to the understanding of pollutant transfer.**

A better characterisation of hydrology and hydrodynamics in the saturated zone and in the unsaturated zone is a pre-requisite to improve the understanding of pollutants transfer.

HYDRO 2 focussed on assessing water input and water output in the **Brévilles catchment**. Together with FLUX 1 sub-module which deals with the chemical aspects, it contributes to pesticides modelling developed in the WP Compute 2.

KEY ISSUES

HYDRO 2 focuses its research on the Brévilles catchment for which the main management issue is diffuse pesticides pollution by agriculture. Therefore the results of HYDRO 2 are mainly associated with the issue of *Diffuse Pollution by agriculture*.

Results and data obtained in HYDRO 2 are mainly related to the system characterisation and more specifically to the characteristics of soils and waters and to

the understanding of the transport and flux phenomenon in the saturated and unsaturated zones.

- Soil and water hydraulic characteristics: Site data acquisition in HYDRO 2 contributes to a better characterisation of the system and to improve geological and hydrogeological characterisation of the system (HYDRO 2.2, HYDRO 2.3 and HYDRO 2.5). Key parameters associated with soil and water characterisation include water level, water discharge, rainfall, potential evapotranspiration, permeability, water retention factors, transfer velocity and porosity.
- Transport in the saturated and unsaturated zones: The 3D conceptual model developed in HYDRO 2.1 and 2.4 described the geology and the hydrogeology of the Brévilles site and enables improvement of the transfer understanding. HYDRO 2 characterises parameters for each geological / hydrogeological media represented in 3D. Key parameters are reservoir geometry, layer shapes and hydrodynamic characterisation.

RECOMMENDATIONS

The research carried out in HYDRO 2 on water budgets at the Brévilles catchment enabled to draw the following recommendations:

- **Multi-disciplinary approach** is necessary to achieve an adequate characterisation of the system. Therefore, it is necessary to take chemical data *as well as* hydrogeological data into account to characterise the system. For example, the location of monitoring wells or boreholes is often associated with the presence of pollutants: it is, however, very important to consider hydrological criteria when positioning the monitoring wells.
- **Detailed characterisation of the unsaturated zone** enables to anticipate velocity transfer in the unsaturated zone.
- **Long data set series (medium term (at least 3 years) data collection)** is recommended to undertake an adequate data interpretation.
- **Long data series** (3 to 10 years, monthly) enables to define a better sampling strategy and monitoring plan. It provides better trend assessment and enables better management of the systems.

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

- **River basin managers** who decide about the data acquisition program and monitoring plan. These recommendations may have financial and temporal consequences on river basin characterisation and management.
- **Scientists** (consultants, service providers) in charge of assisting river basin manager in River basin characterisation and monitoring plan. They must take into account these technical recommendations (if appropriate) when characterising their site.
- **Researchers**. These recommendations could enable further discovery and understanding of the transport in saturated and unsaturated zones
- **Policy makers**. Raise the awareness of temporal consequences of the above recommendations. Time is necessary to characterise adequately a system.