AquaTerra, a new Integrated Project in FP 6: active since June 2004

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Summary

AquaTerra is one of the first environmental Integrated Projects to be approved within the 6th EU Framework Programme. It has been active since 1 June 2004, and will run for a five years. The project comprises a multidisciplinary team of 45 partner organisations from twelve EU countries and Romania, Switzerland and Serbia. It will investigate the influence of pollutants on sediments, soil and water in selected catchments of five European river basins: the Danube, Elbe, Ebro, Meuse and Brévilles. The primary objective of the project is to provide an improved understanding of the processes in the oil–groundwater–river–sediment system. Results will be made available to interested specialists and the public.

As one of the first environmental Integrated Projects in the 6th EU Framework Programme, 'AquaTerra' has been active since 1 June 2004, and will run for five years. The project hosts a multidisciplinary team of 45 partner organisations in twelve EU countries, as well as in Romania, Switzerland and Serbia. Scientific management of the project is carried out by the Center for Applied Geosciences at the University of Tübingen (ZAG), while financial and administrative management is ensured by the associated company, Attempto GmbH.

The project integrates various disciplines, ranging from biogeochemistry, environmental engineering and chemistry to socio-economic sciences, and activities, involving researchers and practitioners and end-users such as policy-makers, river basin managers and regional and urban land planners. The principal task of AquaTerra is to provide the foundations for an improved understanding of the behaviour of environmental pollutants. This will be achieved by developing numerical models of the groundwater–soil–sediment–river system at selected field sites in four European river basins (Ebro, Meuse, Elbe and Danube) and a small French catchment, the Brévilles. These models will be based on biogeochemical, climatological, and material flux data, and will enable anticipation of adverse trends in soil functioning and the water cycle resulting from global change. The models will integrate key biogeochemical and hydrological processes from the laboratory to the river-basin scale.

AquaTerra is composed of ten sub-projects (Fig. 1). The subproject BASIN has two main objectives: to investigate soil–groundwater–river processes and to examine floodplain–sediment–river interactions near to the mouths of rivers. It provides field research logistics and data to other sub-projects. BASIN will also investigate measures to mitigate the adverse effects of climate change and contamination on catchments.

Building on this, BIOGEOCHEM quantifies filter and transport functions in the vadose zone, and will deliver a better understanding of the fate of pollutants in soils and sedi-

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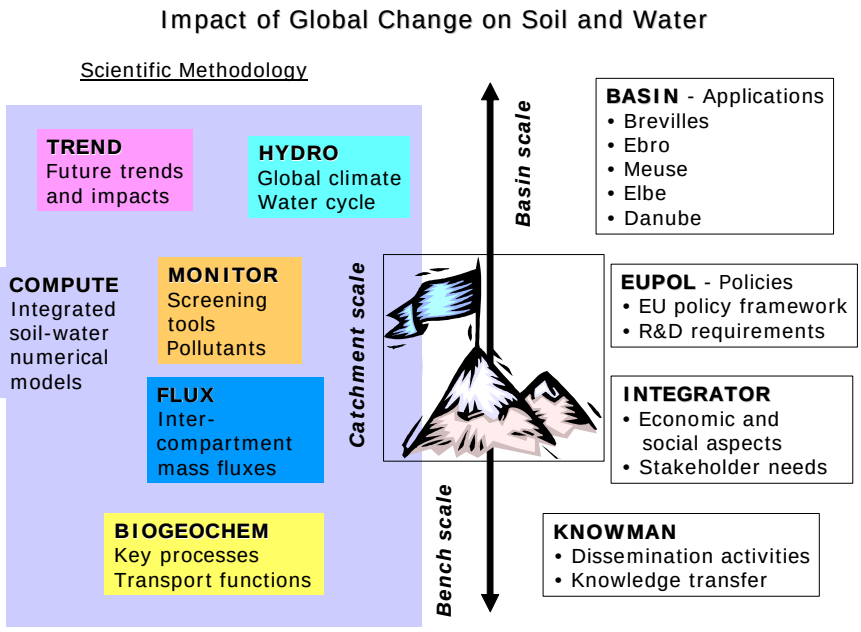

FIGURE 1. THE TEN AQUATERRA SUB-PROJECTS

ments. This understanding will include particle as well as colloid transport, sorption and bioprocesses, and their indirect impacts on water quality. Processes to be investigated include the facilitated transport of solid matter and pollutants in subsurface and surface waters; the interaction of pollutants between solids and water (adsorption, partitioning, desorption); and biodegradation. Inorganic and organic pollutants will be examined, selected by environmental properties such as persistence, bioactivity, flux and dispersion behaviour.

In close collaboration with the above, the sub-project FLUX studies the transport of inorganic and organic solids and solutes to evaluate the effects of changes in land use. It includes fluxes by precipitation, sub-surface and river flow, and incorporates processes such as soil and

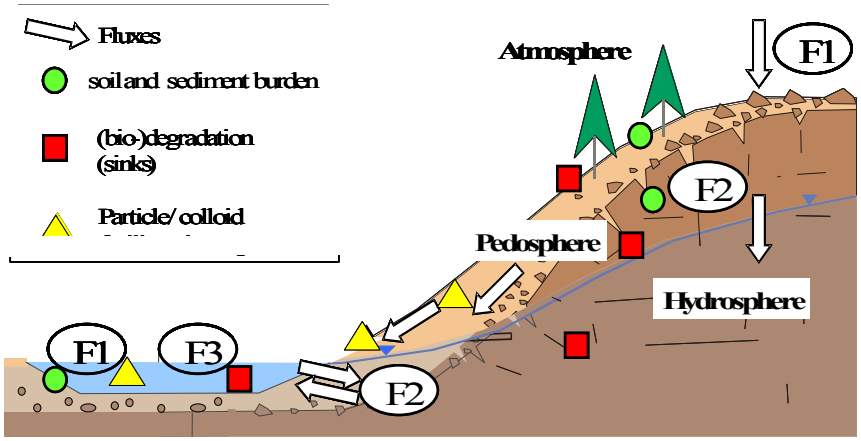

FIGURE 2. POTENTIAL FLUXES THROUGH THE ATMOSPHERE, SOIL, SEDIMENT, GROUNDWATER AND RIVER SYSTEM, SHOWING DIFFERENT FORMS OF TRANSPORT AND SINKS

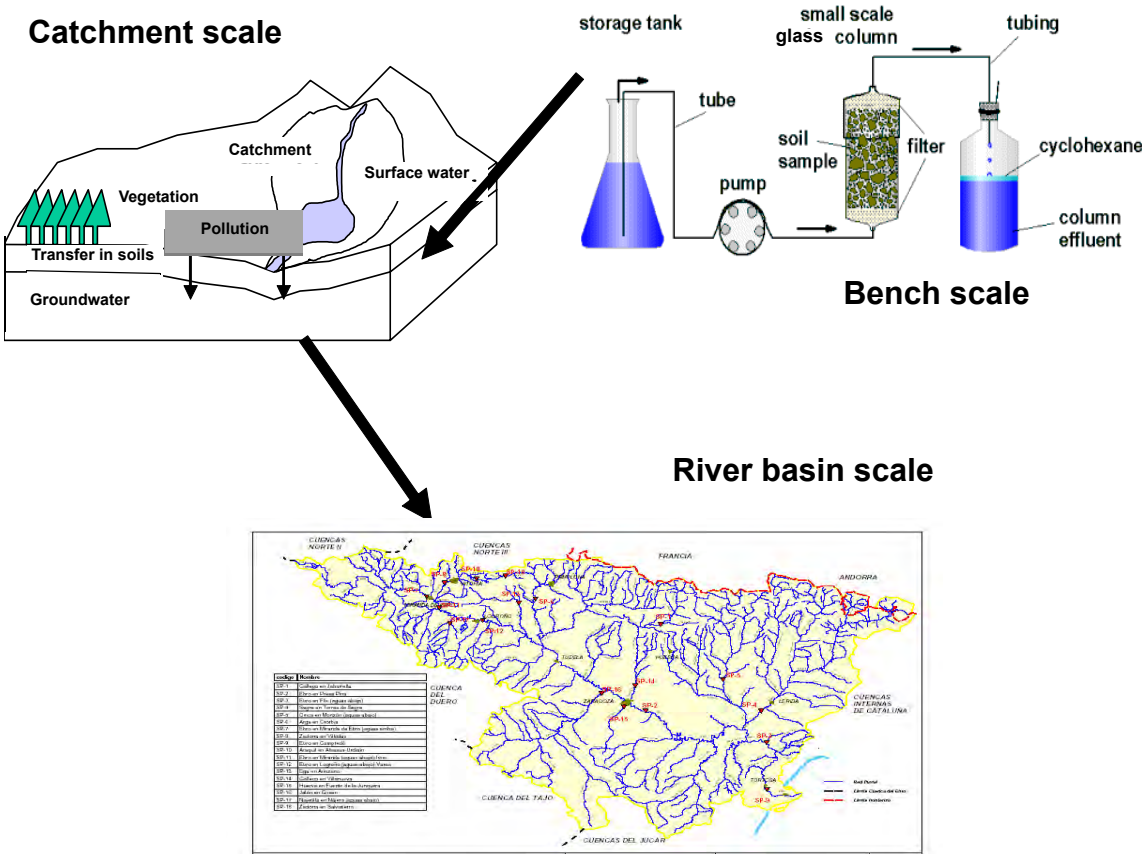

FIGURE 3. MERGING OF SCALES: UPSCALING FROM LABORATORY EXPERIMENTS TO THE RIVER BASIN SCALE BY COMPUTE, AND DOWNSCALING FROM THE GLOBAL SCALE BY HYDRO

sediment burden by contaminants. Sinks using biodegradation and sorption as well as particle- and colloid-facilitated transport are further issues that will be investigated by FLUX (Fig. 2). It will provide input/output mass balances of selected pollutants in small, hydrologically closed, sub-catchments. This approach will then be applied to larger basin areas and will include heavy metals, pesticides and other pollutants.

The sub-project TREND will yield an improved understanding of trends in soil and water quality by extrapolating from historical data to the future and by recognising adverse developments. It focuses on the long-term behaviour of contaminants in the soil–groundwater–sediment–river system and investigates how their functioning is influenced by both anthropogenic and natural perturbations. Unlike other sub-projects, which concentrate on spatial aspects, it primarily deals with change over time, such as the evolution of soil–water–sediment–river ecosystems resulting from global change.

In support of the other sub-projects, MONITOR will develop and validate new analytical techniques by focusing on priority compounds that include persistent organic pollutants (POP) such as pesticides. It will also investigate emerging compounds such as pharmaceuticals by providing new protocols for non-regulated pollutants. New tools to be developed will include bioassays for fast screening and innovative monitoring and sampling strategies.

Using understanding gained from the above sub-projects, COMPUTE performs local to regional up-scaling. For instance, changes in land use will be studied in order to assess their influence on water quantity and quality from bench – via catchment – to river basin scales (Fig. 3). This is achieved

through the detailed characterisation of physical, biological and chemical processes at small scales, and their subsequent transferral to larger scales via input functions (parameterisation). This will allow process understanding gained at the bench scale to be used in larger catchment and river basin models where data are much less readily available.

The sub-project HYDRO provides data to allow evaluation of the impacts of climate change on the water cycle at the river basin scale, in collaboration with COMPUTE and FLUX. It will produce a detailed water balance for the Brévilles catchment that will include inflows and outflows as well as evapotranspiration. Provision of detailed climate data for the Meuse Dommel catchment, as well as for the Ebro Gallego catchment, are also on the way. It will also provide water quantity parameters that can be used to investigate climate change impacts on soil functioning and thus water quality in other sub-projects. To achieve this, it brings together innovative methods in generating climate change and rainfall variability scenarios using downscaling from global models (Fig. 3). These scenarios will be used by COMPUTE to drive their integrated, up-scaled, surface–subsurface river basin models.

To cover important socio-economic aspects, the sub-project INTEGRATOR aims to merge the natural sciences with economic and social sciences by integrating new knowledge and stakeholder needs. It will achieve this by developing approaches and conceptual tools for decision-makers, and will focus on stakeholders and policy makers. The elaboration of decision support systems for different stakeholders incorporates scientific results from AquaTerra, thus providing a first scientific basis for decision-making. In this connection, EUPOL will define the gaps in knowledge for future EU policies that deal with climate change, soil and water quality, land use and pollution. It will investigate the missing scientific background needed for such policies, and will identify information that AquaTerra can provide.

The sub-project KNOWMAN will disseminate project results to scientific and stakeholder communities through workshops, seminars, publishing activities and summer schools. It maintains links with all the other sub-projects; the steering committee; and peer review panel members of AquaTerra who will assess the results obtained from the different sub-projects in order to provide a network for evaluating and disseminating the project results.

The official launch meeting of AquaTerra was held at the Eberhardt-Karls University of Tübingen on 13 and 14 September 2004, with about 150 participants. On the first day, the project was officially launched, with invited participants including members of the European Commission; the mayor of Tübingen; members of the Ministry of Science, Research and the Arts of Baden-Württemberg; the Vice Chancellor of the University of Tübingen; and researchers from Europe and overseas. This meeting attracted local and regional press coverage by radio, TV and newspapers. The second day provided an opportunity for sub-project workshops and plenary discussions. The meeting was a great success, facilitating the exchange of ideas and expertise on environmental issues from top European researchers, environmental protection agencies and small to medium enterprises.

Since the start of the project, the first sampling and exploration activities have taken place, including:

- a sampling campaign on the Danube: samples of suspended and bottom sediments, biological parameters, fish, benthic organisms and water were taken at 30 stations in six different countries over a 1150 km stretch of the river;
- passive sampler installations in the Danube, Elbe and Brévilles catchments: to measure fluxes of persistent organic pollutants such as polyaromatic hydrocarbons (PAHs);
- sampling of 124 sediment and water samples in the Ebro Basin for biological processing;
- magnetic susceptibility screening to map magnetic anomalies as a proxy to narrow down sources of environmental pollution.

Project activities to date have also included soil, sediment and

water sampling in the Ebro, Danube and Elbe Basins; specialist meetings; and the publishing of internal reports and internationally peer reviewed manuscripts (e.g. Baran *et al.* 2004; Barth 2004*a*,*b*; Barth & Grathwohl 2005; Barth *et al.* 2005; Eljarat *et al.* 2004, 2005; Gerzabek *et al.* submitted; Orban *et al.* 2004; Pérez 2004). The active participation of AquaTerra at the 'ConSoil' 2005 conference in Bordeaux is also planned. More information about the project is available at http://www.eu-aquaterra.de/

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Smooth as SiLC?

Paul Nathanail

The Specialist in Land Condition (SiLC) registration scheme was designed to support the use of the Land Condition Record (LCR), launched by the Urban Task Force in 1999. However, it has taken on a broader function of providing clients with a supra-professional qualification, or 'badge of competence' in land quality management projects: many private and public sector tender documents now specify project directors should be a qualified 'SiLC'.

SiLC is supported by most of the professional bodies relevant to the characterization, assessment, remediation and regeneration of land affected by contamination. As such, a SiLC is less someone who knows everything about land condition, and more someone who knows their limits and can engage with the relevant specialist, appreciate their input and integrate the various contributions to achieve project objectives.