Source Control of Priority Substance in Europe

An ambitious goal on the water quality in the European scale is set up in the Water Framework Directive (WFD)(2000/60/EC)[1], that is, all the European water bodies have to reach both good ecological and chemical status by 2015. In response to new WFD regulations, SOCOPSE (SOurce COntrol of Priority Substances in Europe) project, along with several other projects on pollutants management such as MODELKEY(MODELs for Assessing and Forecasting the Impact of Environmental KEY pollutants on freshwater and marine ecosystems and biodiversity) and ScorePP (Source Control Options for Reducing Emissions of Priority Pollutants) was proposed by scientific community and funded by the European Commission (EC).

The launch of SOCOPSE

In 2006, SOCOPSE (SOurce COntrol of Priority Substances in Europe) project was launched under the theme of "global change and ecosystem" of the sixth Framework Programme for Research and Technological development. 11 Participants of the project are from 9 countries (SE, NO, ES, FR, UK, SK, PL, NL, FI). Detailed information such as the funds and participants sees Table 1.

Table 1 Basic information of SOCOPSE [2]

SOCOPSE	FP6-2005-Global-4 (037038)		
Activity code	SUSTDEV-2005-3.II.3.1		
Instrument	Specific Targeted Research Projects (STREP)		
Duration	36 month (2006-2009)		
Total costs	3,103,000 €	Proposed EC grants	1,720,000 €
Participants	-IVL Swedish Environmental Research Institute Ltd (IVL), Sweden (co-ordinator) -Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), the Netherlands - Institut National de l´Environment Industriel et des Risques (INERIS), France - Consejo Superior de Investigaciones Cientifi cas (CSIC), Spain - Norsk institutt for luftforskning (NILU), Norway - Instytut Ekologii Terenow Uprzemyslowionych (IETU/Envitech), Poland - Finnish Environment Institute (SYKE), Finland - Vyskumny Ustav Vodneho Hospodarstva (WRI), Slovakia - Kiwa N.V. Netherlands - University of Southampton, School of Civil Engineering & the Environment (SOTON), UK - Environmental Institute (EI), Slovakia		

Purpose

As a Specific Target Research Project (STREP), SOCOPSE project aims at supporting decision makers and local water authorities to fulfill the WFD obligation with regard to good chemical status of the water bodies. For good chemical status, the Environmental Quality Standard (EQS) of a list of priority substances are expected to be met by 2015 (if additional measures are needed it can be extended but no later than 2027). Therefore, SOCOPSE project is designed to provide guidance for industrial sectors, decision makers and local water authorities to select the most cost-effective measures to abate the existing pollutants through source/emission control and to protect the river basins from future discharges, emissions and losses.

Priority Substances and Environmental Quality Standards

Urged and guided by the Article 16 in WFD 2000/60/EC, European Commission has prioritized a list of substances for evaluating the chemical status of the European water bodies. There are 33 individuals or groups of Priority Substances (PSs) in the list, 12 of which are identified as Priority Hazardous Substances (PHSs) furthermore. Based on Article 16(1), progressive reduction of PSs and cessation or phasing-out of the PHSs are required in the management of European water bodies.

The Environmental Quality Standards (EQS) for these priority substances are described in the daughter directive COM(2006)-397 in 2006 by means of annual average concentration and maximum allowance concentration. Later on, updated EQS table as well as the list of the priority substances are attached as Annex I and Annex II of WFD (2008/105/EC) separately.

Work packages

The whole project is divided into 6 Work Packages (WP) which are listed as follows:
WP 1: Project co-ordination
WP 2: Material Flow Analysis (MFA)
WP 3: Management options for reducing emissions
WP 4: Decision support system (DSS)
WP 5: Case studies
WP 6: Dissemination and stakeholder interaction

In WP1, partners in SOCOPSE project are informed of their own tasks and agendas for the future assembly meetings and the general work progress at the beginning of the project.

For WP2, researchers develop the MFA diagrams of ten selected substances or groups of substances (substances list see Table 2, the first column) based on abundant information from a broad range of sources including scientific literature, international or national databases (e.g. IPPC BREFs, reports/investigations from EPA of member states), results from other projects (e.g. IGBP/IHDP LOICZ, EU ELOISE) and data from international environmental conventions or organizations (e.g. HELCOM, OSPARCom, MEDPOL) and so on. In WP3, literature review and expert judgment result in inventories of source/emission control measures of the ten selected substances or groups of substances

and the overall qualitative and quantitative assessment of these measures.

WP4 aims to offer local water authorities a systematic guidance to identify the problem, analyze the situation and select the best measures for the pollutants abatement. The outputs of WP2 and WP3 are applied in the DSS while DSS itself is tested in the case studies in WP5 in terms of the applicability.

Information dissemination (WP6) is conducted through all phases of the project in various ways such as website, conferences, brochures or posters, site visits and workshops among stakeholders (industry, authorities, NGOs) and so on.

Results

Substance reports

Substance reports summarize the background information like chemical/physical characteristics, related regulations and use & production of the selected PSs and so on. Furthermore, substance reports as important outputs of the WP2 contains tables/diagrams generated from Material Flow Analysis (MFA) to describe the current European sources, fluxes, and endpoint of each selected substance.

Emission reduction strategy reports

Emission reduction strategy reports include the inventory of abatement measures for each substance and the assessment results of the abatement measures in the list. These measures include water treatment technologies, management options, and substitution as well as strategies for monitoring and so on.They are evaluated both qualitatively and quantitatively from the aspects of applicability, performance, cost and state-of-art.

DSS handbook

The DSS developed in SOCOPSE project is rather than a computer software for database management and modeling functions as many conventional DSSs but serves as a structure to collect the inputs and then produce the outputs with which users can develop their Emission Reduction Strategy (ERS). The basic structure of DSS involves seven sequential steps (See Figure 1).

In order to support users to define baseline & management scenarios and select cost-effective measures in an objective manner, DSS has introduced several sound scientific tools which are Cost Effectiveness Analysis, Environmental Fate Modelling, Multi-Criteria Analysis and Social Cost Benefits Analysis.

With the DSS handbook local water authorities, policy makers or drafters of RBMP can select measures to prevent or reduce PSs in the aquatic environment at local, national and/or EU level and at (transboundary) river basin level.

Case studies

Five river basins are selected as the case study areas in WP5 which are located in the North, Central, West and South of Europe (see Figure 2). Based on the information on the land use and human activities, each site selects its own concerned PSs (see Table 2).

Table 2 The selected PSs in SOCOPSE project and PSs monitored in each case study

	PSs monitored in each river basin				
PSs selected in SOCOPSE	Vantaa River	Kłodnica River	Meuse River	Danube Catchment	Ter/Llobregat Catchments
Polyaromatic Hydrocarbons (PAHs)*	×	×	×	×	
Brominated Diphenylether (PBDE)*	×		×		×
Mercury and its compounds*		×	×	×	
Cadmium and its compounds *		×	×		
Tributyltin compounds (TBT)*	×				
Nonylphenol*	×				×
Hexachloro-benzene (HCB)*				×	
Isoproturon			×		×
Atrazine			×		×
Di (2-ethylhexyl)-phthalate (DEHP)	×			×	

(*) Substances have been identified as Priority Hazardous Substances (PHSs) in Directive 2008/105/EC

Case study report covers information of site geophysical description, anthropogenic pressures on the aquatic environment, baseline senario, management results as well as future senario with continuous management/additional measures.

Sites chosen for the case studies are of different geological scales. The case studies involve issues of trans-boundary river basins management, the cooperation of scientific community and policy makers/managers and the effectiveness of stakeholder involvement. Also, it is worth noticing that the importance of the PSs control in RBMP differs from case to case. Lessons/ experiences obtained from the real situation can enhance the feasiblity and relavance of SOCOPSE study results to a European scale.

Conclusion

SOCOPSE project and other pollutants management projects like ScorePP and Modelkey together are sharing information and also shareing the same goal of improving European water bodies to the good status. The DSS handbook, substance reports and emission reduction strategy can be applied to a wide geological region. Furthermore, the tools and methods develped in SOCOPSE are also suitable for managing other priority substances.

References

1 Directive 2000/60/EC of the European Parliament and of the Council; establishing a

framework for Community action in the field of water policy, Brussels, 23-10-2000.

2. EC NG Research (2006) Water cycle and soil related aspects Abstracts of related projects Global climate and ecosystem (calls Global-3 and Global-4).