

# Relationships between ecological and chemical status of surface waters - REBECCA

In this REBECCA newsletter: new report available describing methods and relationships in rivers; the CIS structure (again!); how REBECCA will address the knowledge gaps for rivers; forthcoming meetings.

# Report on existing methods and relationships linking pressures, chemistry and biology in rivers.

WP4 Rivers delivered its first report to the Commission at the end of 2004. The 134 pages report presents the relevant existing knowledge on relationships linking chemical and hydromorphological conditions to biological quality elements in European rivers. The aims of the report are twofold:

- To give end-users an overview of existing methods and relations.
- To establish a common reference between the partners for their further development of relations and methods within the REBECCA project.

The report is structured into five activities according to the working approach of the river WP. Activities 1, 2, 3 and 4 cover the major pressures impacting rivers: hydromorphological pressures, acidification and toxicity, pollution with organic matter and nutrients causing eutrophication. Activity 5 covers multiple pressures in a geographical context.

The review of literature on relationships between physical/chemical quality elements and biological quality elements has identified thousands of publications on these issues. Therefore the first main conclusion is that there is a general and very substantial knowledge on the different types of pressures (types of pollution), on the physical and chemical characteristics and on the impacts on river plant and animal life.

However, very few studies covered the entire causal chain including pressures, physical/chemical quality and biological quality. Most studies have been empirical in nature and all three elements (pressure, physical/chemical quality and biology) have almost never been treated in a quantitative manner. Therefore, only a very tiny fraction of all these scientific results is directly useful as tools in the implementation of the WFD.

The next task of the REBECCA WP4 work on rivers is to analyse and describe relationships between physical/chemical and biological quality elements in rivers. This work is mainly based on available monitoring results from rivers covering both biological and physical/chemical quality elements. With the focus of producing indicators, relationships and classification tools of practical use for the authorities in their implementation of WFD the strategy for this work are to focus on

- Pressure-impact relationships with a direct linkage between the physical/chemical quality and the biota and
- Indicators and metrics describing the biological quality that can be rather generally applied and not limited to be useful for one or a few types of rivers.

The report is uploaded at the project web site: For further information contact WP4 coordinator Jens Møller Andersen: jea@dmu.dk



Hydromorphological pressures on rivers have major impacts on fish populations. At the city of Oulu in the Finnish pilot river basin a dam and hydropower plant built in the 1940s led to the loss of the salmon population. The construction of a fish ladder in 2000 has enabled salmon to re-established a population above the barrier.

# Plans for addressing knowledge gaps for rivers

One of the main outputs from the first year of REBECCA was the report *Relationships between pressures, chemical status, and biological quality elements - Analysis of the current knowledge gaps for the implementation of the WFD* (see REBECCA Newsletter No. 2). This report is useful in its own right as an indicator of areas in which there is adequate, or perhaps some, knowledge and where none, or little, exists. It has also been helpful in informing the REBECCA project as to

how its effort should be focused, since it was clear that lack the of available data and resources meant that not all gaps could be addressed.

The following table indicates, for the river domain only, those gaps to be addressed within REBECCA. Similar information on the gaps to be addressed within WP3 (Lakes) and WP5 (Coastal Waters) will be presented in a future newsletter.

Biological	Identified knowledge gap and whether it is to		Comment
quality	be addressed by REBECCA		
element			
	morphological pressures		
Benthic	Relationships to river morphology, including depth and	Υ	<b>o</b> .
invertebrates	substratum, and its variability	Υ	invertebrate status
	Relationships to the flow regime Relationships to weed cutting and dredging	Ϋ́	
Macrophytes			Relevant existing, national indicators for macrophyte
Macrophytoo	substratum, and its variability		status
	Relationships to the flow regime	Υ	
	Relationships to weed cutting and dredging	Υ	
Activity 2: Acidifi		.,	
Phytobenthos	Acidification tolerance for more species	Y	The indicators used depend on the knowledge gap to be covered
	The effects of H+ separated from co-varying variables	Υ	
Invertebrates	Acidification tolerance for more species	Υ	
	Effects of H+ separated from co-varying variables	Υ	
	Organic material impacts on the relationships between	Υ	
	toxicants	.,	
	Effects of heavy metals in dynamic natural systems with changing water quality.	Y	
Fish	Acidification effects on age structure, growth and	Υ	
1 1511	reproduction	•	
	Effects of H+ separated from co-varying variables.	Υ	
	Organic material impacts on the relationships between	Υ	
	toxics and biotic status		
Activity 3. Organi		_	
Phytobenthos	Functional relationships among organic matter	?	Indicators used depend on data availability, the same
	concentration and biota Impact of different types of wastewater on biota	?	approaches used for invertebrates (see below) will be applied to phytobenthos, for selected case studies
	Response of biota around high/good and lower end		applied to phytoberthios, for selected ease studies
	boundaries	•	
	Effect of the interaction among organic pollution and	Ν	
	discharge		
	Response of biota to urban and agricultural run off	N	
Macrophytes	Functional relationships among organic matter concentration and biota	N	
	Impact of different types of wastewater on biota	N	
	Response of biota around high/good and lower end		
	boundaries	•	
	Effect of the interaction among organic pollution and	Ν	
	discharge		
	Response of biota to urban and agricultural run off	N	
Invertebrates	Functional relationships among organic matter concentration and biota	Υ	Testing of existing biological metrics and selection/definition of dedicated metrics, for various
	concentration and blota		European stream types
	Impact of different types of wastewater on biota	Υ	When possible, different types of chemical perturbation
	Decree of histograms high/or dead laws and	.,	will be analyzed and dedicated metrics selected
	boundaries	T	The shape of the relationships between organic pressure and biological response will be analyzed, in
	Douridanio.		one-stressor as well as in multi-stressor systems
	Effect of the interaction among organic pollution and	Υ	Particular emphasis will be placed on the reaction of
	discharge		biological communities to organic pollution in extremely
	Decrease of bloke to colors at 1 1 1 1 2 2	_	harsh hydrological conditions
	Response of biota to urban and agricultural run off	?	Presumably, not enough data will be available to
	Definition of the relationships between selected	Υ	properly split the two sources of water pollution Following the work set out during the STAR project, the
	European Intercalibration Common Metrics (ICMs:	•	ICM approach (useful for the European IC exercise) will
	biological response, invertebrates) and organic		be tested in terms of its suitability to describe pressure-
	pollution, with and without other pressures acting		response relationships
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Biological quality element	Identified knowledge gap and whether it is to be addressed by REBECCA		Comment
Activity 4: Eutro	phication		
Phytoplankton	Relationships among nutrient concentration and blooms	Υ	Relationships between nutrients and chlorophyll a.  No work will be done on species composition.
Macrophytes	Response of macrophytes to nutrients in the sediments	N	No data available.
	Type-specific applicability of empirical models	Υ	The applicability of selected models will be tested against the datasets available to the REBECCA project.
	Effect of co-varying variables	Υ	Jointly with the activity "Hydromorphological pressures".
	Development of quantitative indicators	Υ	Based on statistical analysis of nutrient concentrations and macrophyte data.
Phytobenthos	How to include filamentous algae in assessment schemes	Υ	Filamentous algae are not routinely monitored in all countries.
	Type-specific applicability of empirical models	Υ	The applicability of selected models will be tested against the datasets available to the REBECCA project.
	Effect of co-varying variables	Υ	Jointly with the activity "Organic pollution".
	Development of quantitative indicators	Υ	, , , , , , , , , , , , , , , , , , , ,
Activity 5: Comb	ined pressures		
Invertébrates	Large scale models allowing spatial extrapolation	Υ	Relevant national biological quality indicators are tested
Diatoms Fish	Interest of ecoregional approach in pressure/impact relationships	Υ	
1 1311	Hierarchy of driving forces (i.e. agriculture vs. urban) and related pressures, according to socio-economic context		
	Basin vs. riparian land use impact, actual buffering capacity of riparian corridor.	Υ	

## The Common Implementation Strategy in 2005/2006

No sooner had the previous REBECCA newsletter been prepared with a description of the activity and organization within the Common Implementation Strategy (CIS) than a new structure was announced for 2005 and 2006. This is based on the positive experiences within the CIS during 2003/2004 which was seen to have introduced considerably improved planning and management. Key deliverables from this period of activity are listed in the table below.

Key priorities identified in the CIS Work Programme 2003/2004 and its status of delivery

Warking Croup	Load	Vay activities/deliverables	Status and comments
Working Group	Lead	Key activities/deliverables	Status and comments
WG 2.A ECOSTAT	JRC	Intercalibration exercise – establishment	Finalised in Oct 2004. Decision on register to
		of the register of sites	be agreed in early 2005
WG 2.A ECOSTAT	DE/UK/JRC	Intercalibration Guidance	Finalised in Dec 2004
WG 2.A ECOSTAT	UK/DE	Guidance on Classification of ecological status including the use of physico- chemical and hydromorphological	Finalised in Nov 2003(Guidance No. 13)
		parameters	
WG 2.A ECOSTAT	JRC	Harmonisation of typology (in particular for transitional and coastal waters)	No specific product. Common types for intercalibration regularly updated
WG 2.A ECOSTAT	COM (ENV) + Steering Group	Guidance on assessment of eutrophication in the context of different European policies	Mandate agreed in June 2004, first part of document available. To be finalised by Dec 2005
WG 2.B IRBM	•	JRC Pilot River Basin Testing exercise	Various products all finalised during 2004
WG 2.B IRBM		IT Guidance on the management of wetlands in the context of the WFD	Finalised in Nov 2003 (Guidance No.) 12
WG 2.B IRBM	FR/NL/ COM (ENV)	Addressing of economical methodological aspects:	Information sheets on baseline scenario, river basin scale and cost recovery Information sheet on environmental costs
WG 2.B IRBM	FR/SP	Preparation of river basin management plans and programmes of measures	Work discontinued following discussion on Water Directors' Meetings
WG 2.C Groundwater	COM/AT	Characterisation and monitoring of groundwater	All finalised during 2004
WG 2.D Reporting	COM/ EEA	Guidance for reporting under the WFD.	Finalised in Dec 2004

Note: Finalised deliverables available in the public WFD library:http://forum.europa.eu.int/Public/irc/env/wfd/library

#### Priority activities for 2005/2006

The CIS process remains strongly supported by the member states, stakeholders and the European Commission, and is seen as the most effective way of addressing issues at the European level. Priority activities for 2005/2006 REBECCA Newsletter No. 3 April 2005

are listed in the table on the next page with tentative dates for deliverables. Notable additions are the link between *agriculture and WFD*, the identification of the need for a new *policy on flood protection*, and the increased importance of work on *environmental objectives*.

Key priorities identified in the CIS Work Programme 2005/2006 and tentative timeframe

No	Key activities	Responsible Group (leader)	Tentative timeframe
A1	Intercalibration exercise	WG A – ECOSTAT (JRc)	Results reported to Committee in July 2006
A2	Eutrophication guidance	WG A – ECOSTAT (DG ENV)	Guidance by end 2005
B1	Integration of pilot river basins into all CIS activities	WG B – IRBM	Outcome report in December 2006
B2	Information sheets on cost-effectiveness	WG B – IRBM (FR)	Information sheets as specified in the mandate
B3	Link to research and Article 5 evaluation	WG B – IRBM (SP/NL)	Various products, finalised in late 2005
B4	Water scarcity	WG B – IRBM (IFR)	Information sheets by the end 2005
C1	Preparatory work on groundwater	WG C – Groundwater	Ongoing
E1	Preparatory work on priority substances	WG E – Priority Substances	Mandate to be developed later
F1	Preparatory work on flooding	Stakeholder meeting	Ongoing
C2	Chemical monitoring	DG Chemical monitoring linked to WG C and E	Mandate to be developed later
D1	Reporting and GIS-development of WISE and reporting guidance 2007 and 2010	WG D – Reporting	Reporting guidance on monitoring end 2005 and on RBMP mid 2007
S1	Link of Agriculture / WFD	SCG	Summary report with key results end 2006
S2	Improving integration of WFD in other policy areas – regional policy, transport/navigation, energy/hydropower (agriculture and research see separate point)	SCG	Ongoing
S3	Environmental objectives	SCG	Stepwise work programme according to discussion paper
S4	Improvement of transboundary co-operation	SCG	Mandate to be defined later

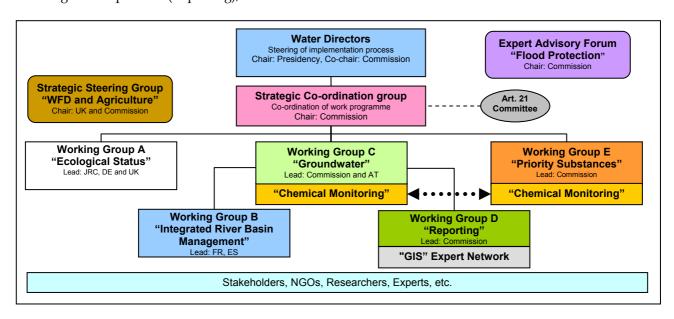
#### **Organisational Aspects**

The working groups established in 2003 will continue (but for simplification are now only know by letters A-D. In addition it is proposed to form **Working Group E on Priority Substances** from the previous Expert Advisory Forum. In association with both this working group and Working Group C (Groundwater) a sub-group on chemical monitoring is proposed to continue the work of the Expert group on Analysis and Monitoring of Priority Substances (AMPS).

The sub-group on GIS is re-established as part of Working Group D (Reporting), with the

responsibility of improving and facilitating electronic reporting and the further development of WISE, "Water Information System for Europe".

Two other new groups have been established. Firstly, a Strategic Steering Group on Agriculture and the WFD is to be established at the same level as the Strategic Coordination Group, to report to the Water Directors, and if requested the Rural Directors. Secondly, an Expert Advisory or Stakeholder Forum on Flood Protection will assist in the development of an instrument on flood protection.



This article is based on material published in "Moving to the next stage in Common Implementation Strategy for the Water Framework Directive - Progress and work programme for 2005 and 2006" which is available at <a href="http://europa.eu.int/comm/environment/water-framework/implementation.html">http://europa.eu.int/comm/environment/water-framework/implementation.html</a>.

### **REBECCA** meetings

A programme of meetings facilitates the REBECCA research activity. REBECCA also participates in a number of externally organized conferences.

Date	Title	Venue
2005		
April 12/13	WP3 Lakes: Macrophytes	Delft, Netherlands
	Contact: anne.lyche@niva.no	
April 21	WP3 Lakes: Chlorophyll	Edinburgh, UK
	Contact: anne.lyche@niva.no	
May 2/4	WP3 Lakes: Phytoplankton	Oslo
	Contact: anne.lyche@niva.no	
May 19-20	ICE River Basin Management: Progress toward implementation of the WFD	Budapest, Hungary
	Information: www.riverbasinmanagement2005.com	
May 30/31	REBECCA: Toxics Group	Gothenburg, Sweden
5.0	Contact: <u>Harm.Duel@wldelft.nl</u>	Dalfa a Nation I and
June 5-9	Shallow Lakes 2005: Shallow lakes in a changing world	Dalfsen, Netherlands
June 16	Information: www.shallowlakes.net/congres	London LIV
Juile 10	Advisory Board  Contact: <a href="mailto:seppo.rekolainen@ymparisto.fi">seppo.rekolainen@ymparisto.fi</a>	London, UK
June 17	Project Board	London,UK
Julie 17	Contact: seppo.rekolainen@ymparisto.fi	London,or
June 19-24	ASLO Summer meeting 2005: A Pilgrimage Through Global Aquatic	Santiago de
, and 10 21	Sciences	Compostela, Spain
	Information: http://aslo.org/meetings/santiago2005/	composition, opanii
July 11-15	Assessing the ecological status of rivers, lakes, transitional	Hull,UK
	waters: a contribution to the EU Water Framework Directive	- ,-
	Information: http://www.hull.ac.uk/hifi/Misc/SYMPOSIUM05.pdf	
Sept 12/13	WP4 Rivers	Slovakia
	Contact: <u>jea@dmu.dk</u>	
Sept 13/14	ECOSTAT Coast GIGs joint meeting with REBECCA WP5 Coast	Intra, Italy
	Contact: anna-stiina.heiskanen@jrc.it	
Sept 27-30	ECOSTAT Lake GIGs joint meeting with REBECCA WP3 Lakes	
	Contact: <u>anne.lyche@niva.no</u> or <u>sandra.poikane@jrc.it</u>	
Oct 13/14	ECOSTAT	Ispra, Italy
Nov 2 4	Contact: anna-stiina.heiskanen@jrc.it	Tallian Fatania
Nov 2-4	WP 6 Validation  Contact: Harm.Duel@wldelft.nl	Tallinn, Estonia
Nov	ECOSTAT River GIGs joint meeting with REBECCA WP4 Rivers	
VOV	Contact: <u>jea@dmu.dk</u> or <u>wouter.van-de-bund@jrc.it</u>	
Dec 12-16	REBECCA: Users' Conference, WPs, Project & advisory Boards	Delft, Netherlands
200 12 10	Contact: Harm.Duel@wldelft.nl or seppo.rekolainen@ymparisto.fi	Dont, Notificialida
2006	Comaca riami. Duologimaonam or coppositoriamonally inpuriotosis	
Oct/Nov	REBECCA: Users' Conference, WPs, Project & advisory Boards	Oslo, Norway
	Contact: anne.lyche@niva.no or seppo.rekolainen@ymparisto.fi	, · · · · · · · · · · · · · · · · ·

Nb. Dates are provisional. Many project meetings are closed – identified contacts can provide information.

#### **REBECCA** web site

Further information about REBECCA is available through the at <a href="http://www.environment.fi/syke/rebecca">http://www.environment.fi/syke/rebecca</a> and in the public area of the REBECCA document store at <a href="http://www.rbm-toolbox.net/rebecca/index.php">http://www.rbm-toolbox.net/rebecca/index.php</a>

#### **REBECCA** newsletter

To be placed on the mailing list for further news about the REBECCA project send an e-mail to <a href="mailto:dbb@ceh.ac.uk">dbb@ceh.ac.uk</a> with the subject 'REBECCA mail list'.

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